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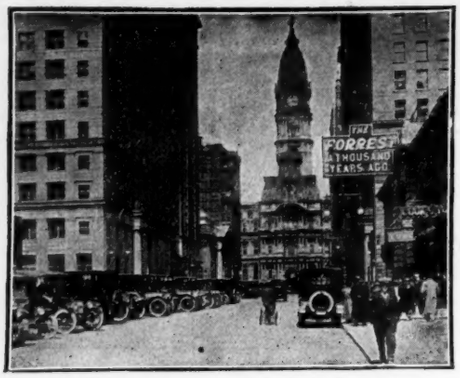

BROAD STREET, PHILADELPHIA, WHERE CAST IRON PIPE WAS LAID 100 YEARS AGO

Interesting Comparisons

Which Indicate That for Long Service Nothing Can Equal

Cast Iron Pipe

BACK in 1817, by way of experiment, 400 feet of Cast Iron Pipe were laid by the "Watering Committee" of the City of Philadelphia. Ninety-eight years later, for no reason except lack of capacity, that pipe was disconnected.

Not only during this entire time that pipe never gave any trouble, but, so far as the material in the pipe was concerned, it was unquestionably good for several centuries of service.

Ninety-eight years of service seems short as compared to the two and a half centuries of service which Cast Iron Pipe has given at Versailles, France. Bear in mind, however, that France is the older Nation and that the Service of Cast Iron Pipe can only be measured by centuries.

Has America heeded the lesson of that "experiment" of the *"Watering Committee"*? Let the facts given here be your answer.

THE FIRST CAST IRON PIPE EVER MADE IN THE WORLD'S HISTORY IS STILL IN SERVICE
SERVICE
CAST IRON PIPE
MEASURED BY
CAST IRON PIPE
CENTURIES
MORE THAN 250 YEARS OLD

The Total Mileage of Cast Iron Pipe

in service at New York, Chicago, Philadelphia, Boston, Baltimore and Minneapolis

equals 4 times the distance between New York and Rome, Italy.

The Total Mileage of Cast Iron Pipe

in service at New York

equals the distance from Buffalo to Rio de Janeiro.

The Total Mileage of Cast Iron Pipe

in service at Chicago

equals the distance from Oklahoma to London, England.

The Total Mileage of Cast Iron Pipe

in service at Philadelphia

equals the distance from San Francisco to Tampa.

The Total Mileage of Cast Iron Pipe

in service at Boston

equals the distance from New York to Denver.

The Total Mileage of Cast Iron Pipe

in service at Baltimore

equals the distance from Philadelphia to Aberdeen, South Dakota.

The Total Mileage of Cast Iron Pipe

in service at Minneapolis

equals the distance from Minneapolis to Atlanta.

Such is the record of Cast Iron Pipe speaking Geographically, but remember while the mileage of Cast Iron Pipe can be measured by man, its service can be measured only by centuries.

The Cast Iron Pipe Publicity Bureau

1 Broadway, New York

Municipal Journal

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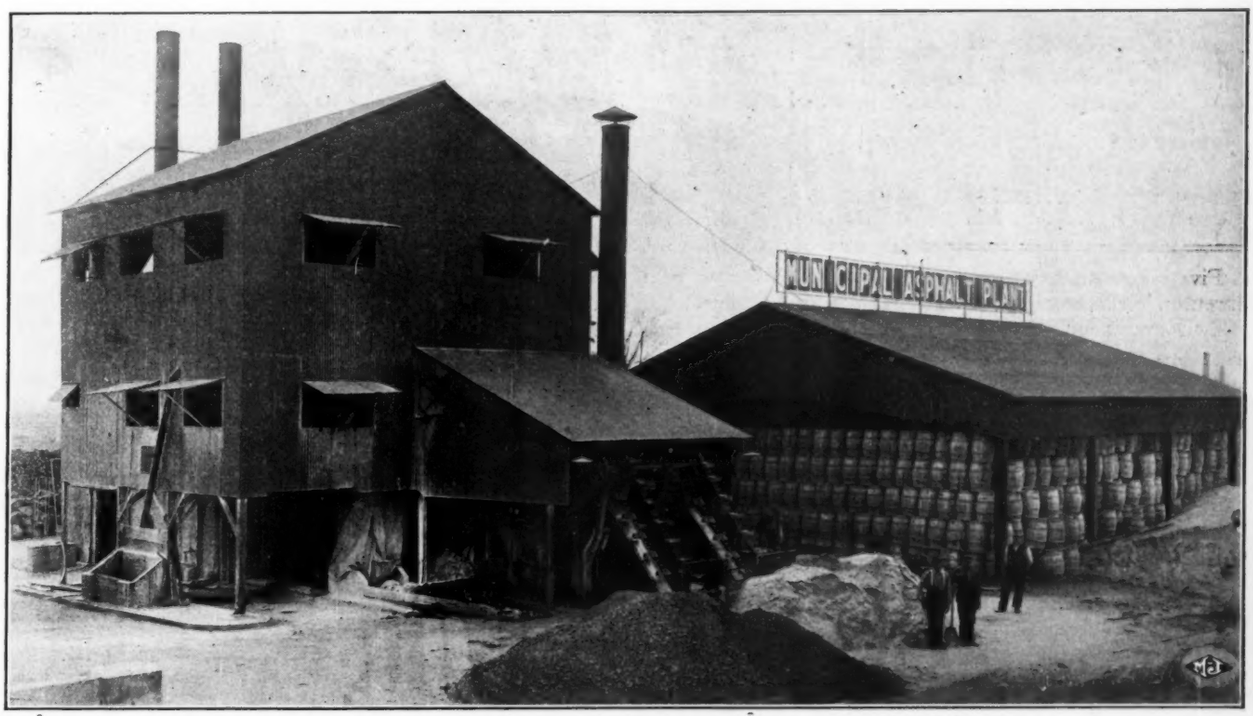
PAVING WORK IN ST. LOUIS

Review of Work Done During 1917 by the Departm ent of Streets in Repairing Asphalt and Block Pavements—Organization of the Force—Itemized Costs—Municipal Asphalt Plant.



MUNICIPAL ASPHALT PLANT OF ST. LOUIS.

The war has not yet materially interfered with paving work being carried on by the city of St. Louis, according to preliminary figures for the calendar year 1917 obtained from the various departments of the city engineering service. The paving work carried on by the city is done mainly under the direction of two departments—the Department of the President of the Board of Public Service, which has complete jurisdiction over new construction, and the Department of Streets and Sewers, which has charge of repairs and maintenance work.

All the new construction is done by contractors and hence the Department of the President of the Board of Public Service concerns itself chiefly with the letting of contracts, supervision of the work and acceptance of the jobs when they are completed.

The repair and maintenance work of the Department of Streets and Sewers, so far as it concerns paving, is carried on by two sections, the bituminous, which looks after asphalt pavements not under contract maintenance, and the block section, which has charge of the various other types of pavement. In addition to these is the contract maintenance section, which has general supervision of all streets and alleys that are under maintenance contract.

New work done during the calendar years 1917 and 1916 is given in the table on the next page.

BLOCK PAVEMENT SECTION.

The organization of the block pavement section consists of 1 general superintendent, 2 assistant superintendents, 1 clerk, 2 inspectors, 10 foremen and 1 chauffeur. The average daily working force consists of 24 pavers, 21 rammers, 116 pavers' helpers and 27 teams.

Two material yards are maintained by this section. One, known as the Western Yard, supplies material to all crews working in the western half of the city. The other, known as the Eastern Yard, supplies materials to all crews working in the eastern half of the city. Each yard is in charge of one assistant superintendent. The crews are divided as follows:

NEW PAVING DONE DURING THE CALENDAR YEARS 1916 AND 1917.

Streets.

	Miles.		Yardage.		Cost.	
	1917	1916	1917	1916	1917	1916
BRICK						
Improved	8.74	4.29	148,134.54	81,052.86	$473.155.30	$216,707.90
Reconstructed	0.43	1.31	9,712.94	27,025.03	38,772.86	62,148.62
ASPHALT						
Improved	1.85	1.32	51,281.04	25,045.09	128,429.38	73,101.06
Reconstructed	1.78	1.34	39,852.03	31,099.99	116,266.02	56,286.85
BITULITHIC						
Improved	1.44	0.36	22,684.74	6,336.59	74,047.79	19,952.47
WOOD BLOCK						
Improved	..	1.04	.....	31,273.81	.....	93,310.12
Reconstructed	0.12	0.69	2,836.78	13,993.96	7,802.01	40,089.91
TELFORD						
Improved	1.62	..	23,807.02	.....	68,008.90	.....

Alleys.

BRICK						
Improved	3.41	7.18	31,117.00	73,212.31	84,831.93	151,464.14
Reconstructed	0.11	0.14	1,498.45	1,188.13	3,008.80	2,225.60

Sidewalks.

GRANITOID						
Improved	2.24	..	7,219.56	.....	15,571.26	.....

Recapitulation.

Streets	15.98	10.35	298,309.09	215,826.89	906,482.26	561,596 93
Alleys	3.52	7.32	32,615.45	73,400.44	87,840.73	153,689.74

Five crews on brick repairs, each one consisting of 1 foreman, 2 rammers, 10 pavers' helpers and 1 team.

Two crews on granite paving, each consisting of 6 pavers, 2 rammers, 6 pavers' helpers and 1 team.

Seven crews on excavations, expansions, cave-ins, leaks, granitoid work and miscellaneous repairs, each consisting of 1 paver-in-charge, 2 helpers and 1 team.

Two crews, in charge of an inspector, on limestone crossings, gutters, alleys and curbing, in the northern half of the city, each consisting of 1 paver, 2 pavers' helpers and 1 team; and a similar force for the southern half of the city.

Approximate estimates of the amount of repair work done in the calendar year 1917 by this section are as follows:

Brick paving..	49,538	square yards at	$1.00	per yard	$49,538
Granite paving	36,040	" " "	.65	" "	23,426
Wood block..	14,088	" " "	1.50	" "	21,132

Some valuable cost figures have been worked out by officials of this section, covering the repair work done in the fiscal year ending March 31, 1917. They give in detail the exact cost, per yard, of various kinds of paving and curbing and are as follows:

BITUMINOUS SECTION.

The bituminous section is one of growing importance, since it is gradually taking over more and more of the work under the jurisdiction of the Contract Maintenance section, following the installation of a municipal plant a few years ago, which has been a marked success.*

The organization of this section is as follows: One engineer, as superintendent, 1 assistant superintendent, 1 plant foreman, 11 street foremen, 3 plant engineers, 4 roller engineers, 1 chauffeur, 3 clerks, 1 chemist, 1 assistant chemist, 1 blacksmith, 1 machinist, 12 asphalt rakers, 19 asphalt tampers and smoothers, 73 laborers and 23 teams.

The bituminous section last summer employed four rollers—one Erie of 5 tons, one Kelly of 5 tons, and two Kellys of 8 tons. During the summer the section worked seven asphalt repair gangs and 27 resurfacing gangs. The repair gangs generally consisted of about 8 men each, and the resurfacing gangs of from 20 to 35 men each. There were also in service 19 teams and 5 trucks, 3 of the trucks being devoted to oiling and two to hauling

*This plant was described in the issue of Municipal Journal for Nov. 21, 1912.

COST OF REPAIR WORK DURING THE FISCAL YEAR 1916-1917.

Streets.

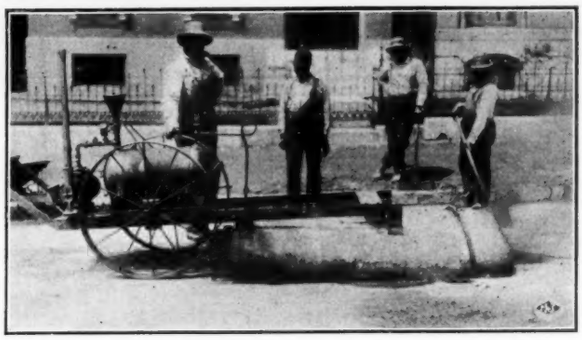
	Number of Sq. Yds.	Material Cost	Labor Cost	Total Cost	Material Cost Per Yard	Labor Cost Per Yard	Total Cost Per Yard
Brick	71,280	$22,366.38	$46,023.87	$68,390.25	$0.31378	$0.64568	$0.95946
Granite	36,696	3,697.04	19,298.00	22,995.84	0.10075	0.52591	0.62666
Wood Block	13.837	8,942.55	7,920.40	16,862.95	0.64627	0.57240	1.21867
Limestone	6,281	499.77	7,233.53	7,733.29	0.07956	1.15165	1.23121

Curbing.

	Number of Lin. Feet	Material Cost	Labor Cost	Total Cost	Material Cost Per Foot	Labor Cost Per Foot	Total Cost Per Foot
Granitoid Curbing..	1,755	$1,331.90	$3,715.09	$5,046.99	$0.75891	$2.11680	$2.87571
Granite Curbing....	4,524	3,723.26	1,919.08	5,642.33	0.82300	0.42419	1.24710

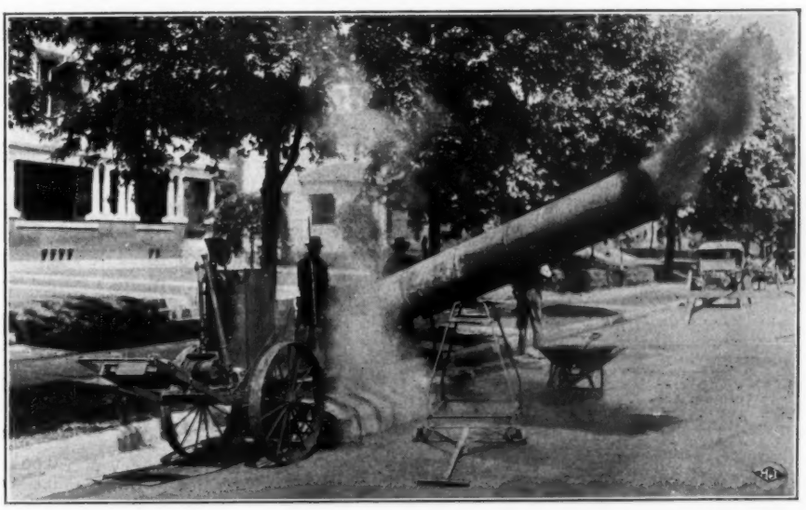
Excavations.

	Number of Excavations	Sq. Ft. Concrete	Sq. Ft. Paving	Cost	Amount Charged	Profit
Wood Block Excavations	85	1,074	1,799	$484.82	$467.28	.....
Brick Excavations	587	15,884	22,776	4,691.42	4,752.20	$60.77
Granite Excavations	434	7,331	12,574	2,173.72	2,623.64	449.92



PATCHING WITH ASPHALT SURFACE HEATER.

asphalt, the oiling branch being a subsidiary of this section. The trucks consist of one Mack, one Saurer and three White trucks, the three White trucks being devoted almost exclusively to oiling. One of the trucks is a 3-ton machine and the other four are of 5 tons each. The trucks have separable bodies and automatic hoists. In winter, when the oiling work ceases and the asphalt plant is closed, the trucks are used to haul snow from the streets. During the present winter, however, owing to the difficulty in getting coal for the city institutions, they have been hauling coal as well.



An interesting feature of the work of the burners is a pipe attachment used to divert the smoke from trees that may line the street. The pipe is attached to the carrier with a swivel, and, as shown in the cut, is elevated or lowered as desired by means of the adjustable support. The pipes are, as a rule, 14 inches in diameter, and their length is varied to suit conditions, by adding or removing sections at will.

The plant, which has a daily capacity of 1,500 tons, is located on a spur of the Missouri Pacific railroad on the outskirts of the city. The site is 310 by 80 feet. The plant proper is a 3-story steel frame structure sheathed with 20-gauge corrugated iron. The second and third floors are of reinforced concrete slabs, 5 inches thick, which can support a weight of 250 pounds a square foot. Iron stairways connect the various floors.

On the ground floor is the drying apparatus, which consists of two 40-inch dryers. The cold sand is discharged directly into the dryers by a feed elevator. When the sand is heated, it is carried by a chain and bucket elevator to the third floor, where it is passed through a 30-inch rotary screen into a bin having a capacity of 350 cubic feet. Tailings are discharged through a spout to a bin outside the building for use later in making binder. The screen is so arranged that when it is desired to run binder, the discharge from the elevator may be let directly into the bin unscreened.

From the bin the sand passes through an orifice in the bottom, controlled by a swinging cut-off gate, into a weigh box on the second floor, which in turn discharges through a gate in front into the mixer, which is just below it.

The limestone dust is carried from the ground to the third floor by a chain and bucket elevator and deposited in a storage bin having a capacity of 300 cubic feet. From the bin the dust is conveyed to the hot sand weighing box by a screen conveyor operated through a friction clutch. At the weighing box the scales for the hot sand are so arranged that the proper proportion of dust may be mixed with the sand.

The asphalt, lifted to the third floor by a 2,000-pound platform elevator driven by a 5 by 5 vertical engine, is melted and prepared in a large tank, divided into three compartments of 2,085 gallons each. Each compartment has three removable self-draining steam coils of 1¼-inch seamless pipe, the coils having a total length of 640 feet. To reduce heat losses by radiation, the outside of the tank, below the third floor, is covered with asbestos.

Agitation is supplied by either steam or air. The air is furnished by a 6 by 10 by 6-inch Clayton flywheel air compressor, with a capacity of 80 feet per minute. The compressor is operated by steam, so that compressed air may be furnished without operating the whole plant. Two 65 h. p. horizontal tubular boilers supply the steam.

The cement flows by gravity to a measuring bucket mounted on a carriage running on an overhead trackway leading from the kettles to the mixer.

Oil for the asphalt is kept in an 18,000-gallon storage tank, 9 feet in diameter by 38 inches in length, which stands in the yard. The tank is divided into compartments, each having independent heat coils, air connections, inlets and outlets. The compartments may be connected by a siphon connection or by air pressure, which also serves to elevate the oil to the 300-gallon flux weighing tank

RESURFACING WORK BY BITUMINOUS SECTION.

which rests on a 3,000-pound platform scale on the third floor.

The mixer is constructed to mix batches of 1,000 pounds of top mixture at a time. The mixture is discharged through a sliding gate, operated by a lever, into wagons and trucks underneath, which convey it to the repair gangs.

The asphalt in barrels is stored in a shelter house which has a capacity of 400 tons. Four inverted lawn sprinklers fastened to the ceiling serve in hot weather to wet down the asphalt.

The proportions used in making the top mixture per box of approximately 1,735 pounds are as follows: Asphalt, 185 pounds; dust, 250 pounds, and sand, 1,300 pounds. One-fourth of the sand is coarse Meramec river sand and three-fourth is fine Mississippi sand. The proportions for the binder mixture, also per box, are: Asphalt, 85 pounds; stone, 1,080 pounds, and sand, 270 pounds, the sand being divided in the same manner as mentioned above. The proportions in both cases may vary slightly at times, but the above are the averages.

According to preliminary estimates compiled by superintendent Brighton, approximately 140,000 yards of asphalt paving, all repair work, were laid in the calendar year 1917. The cost in place per yard was about 85 cents, exclusive of overhead charges.

At the present time about 2,650,000 yards of surface are being maintained by the section. The cost of maintenance per yard per year is approximately 6 cents, according to the figures for 1917. This low cost, however, is attributable in part to the fact that most of the materials were purchased before the United States entered the war. In the calendar year, 1,500 tons of asphalt were used, the average cost per ton being $18.

Some interesting figures on detailed costs have been worked out covering the fiscal year from April 1, 1916 to March 31, 1917. They are as follows:

Itemized Costs of Asphalt Repair Work, 1916-1917.

	Plant Cost.			Street Cost.			Plant and Street Cost.	
Nature of Maintenance	No. of Boxes	Material Labor & Haul	Per Box	Sq. Yds. Laid.	Labor & Material	Per Sq. Yd.	Material, Fuel, Labor & Haul	Per. Sq. Yard
Pan-Patching	343	$1,351.68	$3.94	3,958	$1,518.08	$0.3835	$2,869.76	$0.7250
Plant Patching	9,471	42,659.13	4.50	105,221	27,016.46	0.2567	69,675.59	0.6621
Plant Binder	1,408	4,098.38	2.91	18,679	3,825.60	0.2048	7,923.98	0.4242
Resurfacing	4,368	19,122.85	4.38	50,437	5,697.66	0.1129	24,820.51	0.4920
Resurfacing Binder	3,759	10,230.37	2.72	39,037	4,487.35	0.1149	14,717.72	0.3770
Total	19,349	$77,462.41	$4.00	217,332	$42,545.15	$0.1957	$120,007.56	$0.5522

	Miscellaneous Cost.					Total Cost.	
Nature of Maintenance	Plant Repairs Labor	Plant Idle Time	Street Idle Time	Tool and Equipment Repairs	Overhead	Total	Plant, Street and Misc.	Sq. Yd.
Pan-Patching	$131.26	$34.75	$96.79	$30.57	$102.90	$396.27	$3,266.03	$0.8256
Plant Patching	3,624.53	959.40	1,374.22	843.86	2,841.30	9,643.31	79,318.90	0.7538
Plant Binder	538.81	142.63	204.29	125.44	422.40	1,433.57	9,357.55	0.5043
Resurfacing	1,671.63	442.46	633.79	389.18	1,310.40	4,447.46	29,267.97	0.5802
Resurfacing Binder	1,438.55	380.76	545.43	334.93	1,127.70	3,827.37	18,545.09	0.4756
Total	$7,404.78	$1,960.00	$2,854.52	1,723.98	$5,804.70	$19,747.98	$139,755.54	$0.6430

The patching pans, of which there are four, are used only for emergency work, when the plant is shut down, as for the winter. Most of this work is temporary only and generally is done over again when the plant is in operation. The four pans are located at the plant and the material is transported by the usual methods to the work.

The pans in use in St. Louis were made locally and consist of concave pans of thick sheet iron mounted on brick supports. They measure, with the supports, about 4 feet by 4 feet by 20 inches, and each holds about 25 cubic feet of material, making about half a wagon load. The tops of the pans are open and the melting material is mixed by a crew of four men, using long-handled shovels.

The cost of operating the various sorts of motor trucks for the same fiscal year were as follows:

Costs of Operating Motor Trucks, 1916-1917.

	White No. 4.	White No. 5.	Mack.	Saurer.
Gasoline	$265.73	$242.73	$242.93	$225.49
Lubricants	57.48	50.48	64.78	35.84
Grease	3.58	3.06	1.08	3.57
Repairs	4.50	....	42.65	53.80
Material	140.02	75.10	36.87	227.12
Mechanic's time	....	....	91.37	210.19
Stack	.50	.45	20.94	35.25
Total	$471.81	$371.82	$500.62	$791.26

The officials in charge of the work are: President of the Board of Public Service, E. R. Kinsey; Director of Streets and Sewers, C. M. Talbert; Street Commissioner, J. M. Slater; Superintendent of Block Pavement Section, P. H. Koncen; Engineer of Bituminous Pavement Section (and superintendent of the asphalt plant), O. S. Brighton.

REPAIRING BITUMINOUS PAVEMENTS*

Causes of Defects and Methods of Treating Each—Use of Hot Binders and of Cold Bituminous Mixtures.

In a paper dealing with this subject, G. H. Biles, second deputy state highway commissioner of Pennsylvania, divided the subject under the heads of "bituminous macadam pavements" and "bituminous concrete pavements." The most common deficiency in the former class of pavement is found, he said, in non-uniformity of surface. The causes of defects in such pavements he classified under six heads; and following the classification, he explained the methods of treatment which have given the best results.

The first defect consists of spots of excessive bituminous material and bare or lean areas, resulting in a ravelling or break up of the road surface. This condition is usually caused by improper distribution or by applying the bituminous material when the stone is not thoroughly dry. Such a road, if taken in time, can be repaired by sealing the dry or lean spots with a light, heated application of bituminous cement of the binder grade, or with cold bituminous surface treatment materials in quantities

*Abstract from a paper presented before Section D of the American Association for the Advancement of Science, by Geo. H. Biles, Second Deputy State Highway Commissioner of Pennsylvania.

ranging from 1/10 gal. to 3/10 gal. per square yard, and covering with chips or pea gravel, using between 15 and 20 pounds to the square yard. Unless the surface is badly worn, such repairs will even it up to a true cross section and add to the life of the pavement.

The second condition is a rough surface, the stone loosened or ravelled and the binder showing rapid deterioration, generally resulting in a series of pot holes. This may be caused by improper or over heated bituminous material, unsatisfactory aggregates, or faulty drainage. Such a condition calls for heroic treatment, complete scarifying and harrowing of the surface being necessary if it covers a considerable area. All disintegrating material must be removed and sufficient new stone added to give the required depth before applying the bituminous material. If the defects are found in only occasional small areas, however, they may be cut out, cleaned thoroughly and filled with new stone, compacted and then penetrated as in case 1. If drainage conditions are responsible they must be corrected before any surface repairs are begun.

The third condition is that of a surface apparently lifeless, but in which bituminous binder with life is found at a slight depth below the surface. In many cases this has been caused by insufficiency of bituminous material. The least expensive remedy is to fill the surface voids with a bituminous material that will penetrate and enliven the old material, and cover with good, hard stone chips, using about 20 pounds to the square yard. An alternative method is to thoroughly clean and then scarify and harrow the entire surface, supplying additional new stone if this appears to be necessary to give the proper cross section, roll the pavement and penetrate with a bituminous binder as in original construction. If the bitumen in the old pavement does not possess life, however, this method is a hazard.

The fourth case is that of a wavy and uneven surface, which is usually due to an excess of bituminous material, or the use of material too soft for the traffic. The most economical and satisfactory remedy is generally to scarify and reshape the surface. If the condition was caused by a too soft binder, it is necessary to add considerable stone and incorporate a harder binder than was used in the original construction. If there are only occasional waves in the surface, these may be cut off and the exposed surface resealed, or the depressions may be cut out and replaced with new material.

Fifth—Ridges may be caused by irregular or improper pouring, in most cases careless hand pouring. Such a surface suffers quickly from traffic and the elements and disintegrates rapidly. If the defect is not too pronounced the surface may be evened up by painting between the ridges with bituminous cement and covering with stone chips or gravel; continuing this treatment from time to time until the surface is entirely evened up. Or the surface may be scarified (with the object of more uniformly distributing the old bituminous material) and, after rolling to a proper shape, given a surface treatment of cold bituminous material that will enliven the existing material and seal the surface, covering with stone chips as in regular surface treatment work.

Sixth—A fairly well shaped, uniform surface may become porous, which occurs to all bituminous highways in time as it represents the beginning of deterioration of the bituminous material. The old bitumen can be enlivened or revived by cleaning the surface and applying a seal coat of material in quantities depending upon the degree of disintegration. An excessive amount will result in a slippery condition very objectionable to horse-drawn traffic. Usually 1/10 to 1/6 gallon is used and brushed into the surface with hand brooms and about 20 pounds of chips or gravel to the square yard is applied. Some slowly drying cold bituminous materials soften up the old bitumen somewhat and at first give the appearance of an excessive application, which condition, however, disappears after a short period. To insure the best results, one-half of the road should be treated at a time in order that the traffic may use the other half while the bituminous material is setting up. This method has proved quite effective and resulted in increased life of the pavement.

In repairing small local defects, it is more satisfactory to use hot bituminous binders, and if replacements are necessary they can be made after the fashion of the original construction. Cold bituminous compounds have been used successfully in certain seasons of the year, but in cold weather there is usually difficulty with some of this material owing to its composition. In some cases the emulsified products break down or separate and their adhesiveness is destroyed at low temperature. Materials that are cut back with natural solvents can be used later and give very good results. The mixtures can be prepared at some point not exposed to the weather but convenient to the work, to be used as needed. This is an effective method in case of emergency.

BITUMINOUS CONCRETE.

Cracking is one of the most common and earliest defects appearing in bituminous concrete pavements. Such cracks may occur immediately above cracks in the base caused by contraction, or because the pavement does not receive sufficient traffic to iron out and close up the surface after low temperatures have caused contraction cracks.

The bituminous mixtures expected to receive heavy traffic should be tough and fairly hard in order to resist displacement, while those designed for light traffic should be made softer and more yielding by using softer bitumen. Pavements containing hard or non-ductile bituminous material have a greater tendency to crack than those made with softer bitumen. Cracking and even general disintegration may result from the use of too little bitumen, or from overheating the bitumen, which reduces its bonding power.

Cracks, unless caused by some serious form of disintegration, can be repaired by cleaning them out thoroughly and pouring them full of hot or cold bituminous mixture of the proper grade and then tamping or wedging stone chips into the cracks, thoroughly sealing it. If the crack is wide and the edges have crumbled or broken off, they should be cut down evenly and the opening filled and tamped with a mixture of one part bituminous cement to nine parts of chips, in sufficient quantity to completely close the crack.

A bituminous concrete satisfactory in all other respects may show surface indications of slight disintegration; the gloss is gone and the surface approaches a light brownish hue. This is speedily followed by a general porous condition which, if not promptly corrected, will allow the surface to retain moisture which will break the bond, causing ravelling and failure of the pavement. If the entire surface is cracked and generally bad and if gradually crumbling away due to disintegration, the surface must be entirely replaced with a new one. If this condition develops locally into pot holes or depressions, these can be repaired by cutting out the defective areas down to the foundation and replacing with a new mixture. A bituminous concrete pavement which begins to have a dry, porous appearance can be revived with a light bituminous surface application as in the case of bituminous macadam.

A wavy surface is generally caused by the bituminous mixture being too soft and pushing under traffic. It may result from using material during construction that was not at a temperature suitable for raking to a uniformly

loose condition, or to creeping during rolling resulting from careless handling or from being rolled while too hot. Pushing or waving in local spots may often be traced to the laying of the mixture on a dirty surface. A wavy irregular surface is in most cases positive proof of the inability of the pavement to meet the traffic conditions, except when it results from faulty methods of construction. If the materials were inadequate for the traffic and irregularity of surface steadily increases, reconstruction will eventually be necessary. If irregularities were caused by careless methods of spreading, beneficial results can be obtained by rolling the surface in hot weather with a tandem power roller.

Wearing and deteriorating along the edges of the pavement where there is no header necessitates some of the most troublesome and expensive forms of repair required by roads of this type. Moisture in the shoulders and foreign materials tracked from them onto the pavement are largely responsible. This is specially pronounced when the material in the shoulders is of a non-porous nature, the moisture in the shoulders attacking the bituminous material. When the edges of the pavement break down, the first and most essential necessity is to correct the cause, providing adequate drainage to the shoulders if this is necessary and, if they are composed of non-porous material, cutting small surface ditches at intervals of about 20 feet and replacing the material immediately along the edge of the pavement and for a depth of a few inches with broken stone or gravel tamped into place.

Unless the repair work is extensive, it is not advisable to use hot bituminous compounds, cold cement being more convenient and economical if the proper mixture is used in the regular working season. Hot bituminous repairs are not generally satisfactory when made at low temperatures, but Mr. Biles believes that it is better to patch with bituminous materials even in cold weather than to use bricks or stone blocks for this purpose, as is done in some cities; since the latter is annoying to traffic and, when the regular repairing season arrives, it will usually be found that the area needing repairs has been considerably enlarged. Some advocates of brick or stone block repairs claim that that method insures that the affected portions will not be overlooked when repair work is taken up in the spring .

Where there is enough yardage to warrant a central mixing plant, this is the most satisfactory method of handling bituminous repairs, as more uniformity in mixing is assured. In most cases, however, the work must be done by a small town having a few streets to maintain, and for such the author believes that the cold bituminous mixture method with the proper materials is the most economical and fool-proof method for ordinary repairs. Repairs have been made with such method on extremely heavy travelled roads that are in excellent condition after four seasons of wear. Trained men have prepared good hot bituminous mixtures by hand, but considering the chances taken of overheating the material, carelessly mixing it, and the extra expense connected with handling the equipment, this method does not seem to be justified.

STATE HIGHWAY WORK IN PENNSYLVANIA.

State highway commissioner J. Denny O'Neil has stated that work on the Pennsylvania State Highways will proceed this year with greater vigor than ever. The work will be done by contract and the high prices of materials will not cause a decrease in amount done. If, however, bids for any piece of work are considered by the engineers to be too high, they will be thrown out and new bids advertised for.

The commissioner realizes that maintenance will be the important feature this year, as the unprecedented heavy trucking which will undoubtedly pass over the main arteries of the state will try the durability of the roads and necessitate continuous maintenance of the highest character. Fortunately, the state will have more money for maintenance than in previous years and the Highway Department plans to make every effort to use it to aid the government in solving the transportation problem.

STREET REPAIRS IN COLUMBUS, OHIO

Lessons from Several Years' Experience in Maintaining and Repairing Various Classes of Pavement—Work Done by Municipal Asphalt Plant.

By CHARLES CARROLL BROWN.

While the city of Columbus, O., does not publish reports of the operations of all its city departments, reports are made by some officials in considerable detail and are on file so that they can be made use of by those interested. The reports of street repairs, made by the Department of Street Repairs under the charge of Thos. H. Brannan, superintendent of asphalt repairs and of the municipal asphalt plant, are particularly full and comprehensive and a study of them gives many pointers as to methods and cost which should be valuable to other cities.

ASPHALT.

The city operates a Hetherington and Berner asphalt plant of good design and proper capacity during a part of each season in repairing asphalt streets with standard asphalt mixtures and, in case of very old streets, with bituminous macadam. The plant also supplies materials for covering old brick and stone block pavements with two-course asphalt paving and does a considerable amount of repair work for street railway, water and sewer departments and plumbers, for which definite charges are made, large enough to cover all expense, including interest and depreciation on plant and tools. The street rollers belonging to the department are also rented at prices which probably are sufficient to cover all charges, though there is not much leeway.

Asphalt streets are usually repaired with asphalt and require little special description. Repairs are kept up from year to year, so that there is little variation in yardage of repairs. Thus on 23 streets with a total area of 142,737 sq. yds., for which figures are available for six years, the total yardage of repairs was 9,254 in 1911, 13,135 in 1912, 12,690 in 1913, 8,433 in 1914, 5,904 in 1915 and 13,209 in 1916. All of these streets were 21 to 28 years old at the beginning of 1916, except one which was 15 years old. The increase in cost due to increase in price of materials and labor is shown by the average cost of the asphalt repairs for the 5 years, 1911 to 1915, being $1.03 per yard actually repaired, while it was $1.14 for 1916. Computed for the total area of the street, the cost for asphalt repairs for the 5 years 1911 to 1915 averaged 7 cents per square yard per year. Taking the asphalt streets of the same list which were repaired with asphalt in 1916, the average cost per square yard per year was 5.47 cents. Some of the older streets were repaired with asphaltic concrete, but as the cost of the asphaltic concrete was 85 cents per square yard as compared with the $1.14 for asphalt, above given, the actual average cost of repairs of the same 23 streets was 95.1 cents per square yard of actual repairs, but, computed on the total area of the streets repaired, the cost was 8.44 cents per square yard per year.

This high cost per square yard of total area was due

to the heavy bill for repairing one street with asphaltic concrete, 20 cents per square yard of its total area. If this street is omitted, the average cost of repaving the others is 5.9 per square yard for 1916. A double street-car track, heavy traffic, a crushed stone foundation, an age of 21 years, and no repair cost in 1915, are the reasons for the high cost in 1916 on this one street. However, in the 4 years 1911-1914, 64 per cent of its area had been repaired with asphalt, or an average of 16 per cent each year and, although no repairs were made in 1915, not more than 21.6 per cent of its area was repaired in 1916.

Effect of Foundation on Asphalt Repairs.—The effect of foundations on the cost of asphalt repairs is shown by classifying repairs on this basis. The results given are averages for the 5 years 1911-1915.

Three streets had been re-surfaced with asphalt wearing surface and no binder course over old brick pavements. The repairs cost $1.19 a square yard as made. In 5 years 53 per cent of the area had been resurfaced, or an average of 10.6 per cent a year, and the cost per square yard per year was 12.65 cents. The age of the resurfacing was not given.

Four streets were of asphalt or crushed stone base. The repairs cost $1 a square yard as made. In 5 years 53 per cent of the area had been resurfaced or an average of 10.6 per cent a year and the cost per square yard per year was 10.57 cents. The per cent of the area repaired varied from 22 to 64 per cent. The average age of the 4 streets was 22¾ years, ranging from 15 to 28.

Eight streets were of asphalt on old cobble-stone base. The repairs cost $1.05 a square yard as made. In 5 years 32 per cent of the area had been resurfaced, or an average of 6.4 per cent a year, and the cost per square yard per year was 6.33 cents. The area covered by the repairs in the 5 years averaged from 18 per cent in a street 28 years old to 42 in one 25 years old. The average age of the 7 streets given was 24 years, ranging from 19 to 28 years.

Eight streets had concrete base. Repairs cost $1.06 per square yard as made. In 5 years 25 per cent of the area had been resurfaced or an average of 5 per cent a year and the cost per square yard per year was 5.4 cents. The area covered by the repairs in 5 years ranged from 14 per cent in a street 26 years old to 32 per cent in one of the same age, with one 22 years old of 66 per cent. The average age of 7 streets given was 25 years, the range from 22 to 27 years.

The collection of these figures in the accompanying table shows the value of good foundations, the smaller area of repairs and lower cost being evident in every case. The only exception is in brick pavements resurfaced with asphalt. The better condition of brick streets resurfaced in later years with two-course asphalt paving is evidence that the higher cost of repair of asphalt over old brick in the table is due to the lack of binder in the surfacing and not to the brick base.

It will be noted also that the age of the pavements is greater as the percentage of area repaired is less. For pavements of the same age, therefore, the lower costs of repairs over the better foundations would be even more pronounced than those shown in the table.

ASPHALT STREET REPAIRS IN COLUMBUS, O.

Kind of Foundation	Brick No Binder	Broken Stone	Cobble Stone	Concrete
Number of streets	3	4	8	8
Age, range, years	..	15-28	19-28	22-27
Age, average, years	..	22.75	24	25
Cost per sq. yd., laid	$1.19	$1.00	$1.05	$1.06
Percentage of area resurfaced per year, average for 5 years	10.6	10.6	6.4	5.0
Cost per square yard of total pavement per year, cents	12.65	10.57	6.33	5.40

Special Conditions.—One street of Bermudez asphalt nearly 3 miles long laid 11 years ago has had no repairs except from cuts for pipes and conduits. The central 52 feet of two blocks opposite the State House is of asphalt on concrete base and 14 feet on each side is of old granite blocks with cement filler which is used for parking space for automobiles. At one end of this portion of the street the slope of the intersecting street is so great that the crown of this street is thrown to one side. The crown runs 167 feet diagonally until it reaches the center of the street and thence keeps its place in the center of the street. The warped surface resulting is so smoothly worked out that the peculiarity of the design is almost unnoticed.

One street of Trinidad asphalt on an old cobble stone base is about 15 years old and has required no repairs except for pipe cuts. The softness of the mixture is probably responsible for the durability of this street.

A Kentucky rock asphalt street now about 28 years old has had light traffic and has worn down until it is not more than ½ inch thick. Probably 75 per cent of the area of the street has been patched, 20 per cent in the 5 years 1911-1915 or 4 per cent a year, and but little more than 2 per cent in 1916.

ASPHALTIC CONCRETE.

In 1916 asphalt concrete was used for repairing eleven streets, as compared with 29 repaired with asphalt, including 2 repaired partly with each. The age of 6 of the streets repaired with asphalt cement is given and averages 24 years, ranging from 21 to 27 years. The area covered by the repairs on the 11 streets ranges from 35 to 5,419 square yards.

The asphalt cement was used on streets nearing the time of entire resurfacing, because this material will last fully as long as the old asphalt still in place and costs 85 cents a square yard as compared with $1.14 for asphalt. If interest on the investment at 4 per cent be added the costs becomes 91 cents and $1.22 cents respectively. Again, old streets can be kept in repair in the summer with the regular asphalt mixture, but when breaks occur in cold weather, which must be repaired to carry the streets through the winter, the regular asphalt repairs are liable to break up and not last through the winter, while the asphaltic cement keeps its place better under such conditions. There is not much of this sort of work required but, when required, the asphaltic cement is preferred for making these patches.

Wadsworth Kentucky rock asphalt used on a wide driveway with very light traffic, ¾-inch of the asphalt mixture being rolled into a layer of broken stone, is in satisfactory condition after two years of use while a thin coat of the Kentucky asphalt on concrete in another portion of the same driveway does not keep its place, many bare spots showing after a year or two of use. A more heavily traveled driveway of bituminous concrete, Topeka mix, in the same vicinity is in good condition after a year of use, some disintegration of a few soft stones being the only evidence of disintegration.

RESURFACING BLOCK PAVEMENTS WITH ASPHALT.

As an improvement on the resurfacing of old brick and stone block streets with asphalt, omitting the binder course, noted in the table above, several streets have been resurfaced within the last four or five years, using the regular asphalt construction with cushion or binder coat and wearing surface. None of these has required repair as yet. The methods of construction and of design so as to take care of the surface drainage are described in a

paper by Mr. Brannan presented to the American Society of Municipal Improvements in 1916. The designs vary according to the local conditions, but in practically every case the result seems to be the same as for new concrete base. The repair costs on these streets, when it begins, will doubtless compare with those given in the above table for asphalt or concrete base.

BRICK.

The patching of brick streets was divided into six districts, each in charge of a foreman. The number of patches made by the six gangs in 1916 was 1,780, aggregating 9,385 sq. yd. or 5.3 sq. yd. to each patch. The labor cost was $5,955.10, or 63.45 cents per square yard.

Two of these foremen repaired 37 patches in Hayden block streets with total yardage of 457.5 and cost of $314.77, making an average cost of 68.8 cents. (The Hayden block is a special form with depressions on the surface to give foothold for horses and all streets with Hayden blocks have been in use for many years.)

The average cost per square yard of work done by the various foremen varied from 46.3 cents to 69.9 cents for brick streets and 60 to 95 cents for Hayden block.

These foremen did not do quite all the brick repairing, as the total number of patches made in 1916 was 2,267, aggregating an area of 9,747 sq. yd., with a labor cost of $6,393.98, averaging 65.6 cents a square yard.

The materials used in making the repairs included 26,097 new brick, costing $458.32, or an average of $17.60 per thousand. Standard paving cost $16.50, and old style $18.25. 88,672 old brick were reused, 4,663 old block and 3,045 Hayden block. There were also used pitch at $9.15 a ton, sand at 85 cents a ton, tools, etc., the total cost of materials used in patching brick streets being $1,775.49.

This makes the total cost of patches, including materials and labor, $8,169.47, or 83.8 cents per square yard. To this cost must be added a proportion of the office salaries.

Some old brick and stone block streets, badly worn and very rough, which should be renewed, were patched with bituminous macadam. The yardage covered was so irregular, especially as to thickness, that it is not given. 190.85 tons of macadam stone were used, costing $148.95; 3,650 gal. asphalt binder, 1,462 gal. of Tarvia X and 95 gal. K. P. Tarvia, costing all together $394.50. The labor of applying cost $642.14, making a total of $1,185.59. If the average depth of the bituminous covering is assumed as 4 inches, this material would cover about 1,200 sq yd. and the average cost would be about $1 a square yard, nearly the same as that for the same material used in patching old asphalt streets.

The total areas of the streets repaired are not given, so that no figures based on these total areas are available. Age of streets is not given.

(To be continued)

LAYING LARGE PIPES IN TUNNEL.

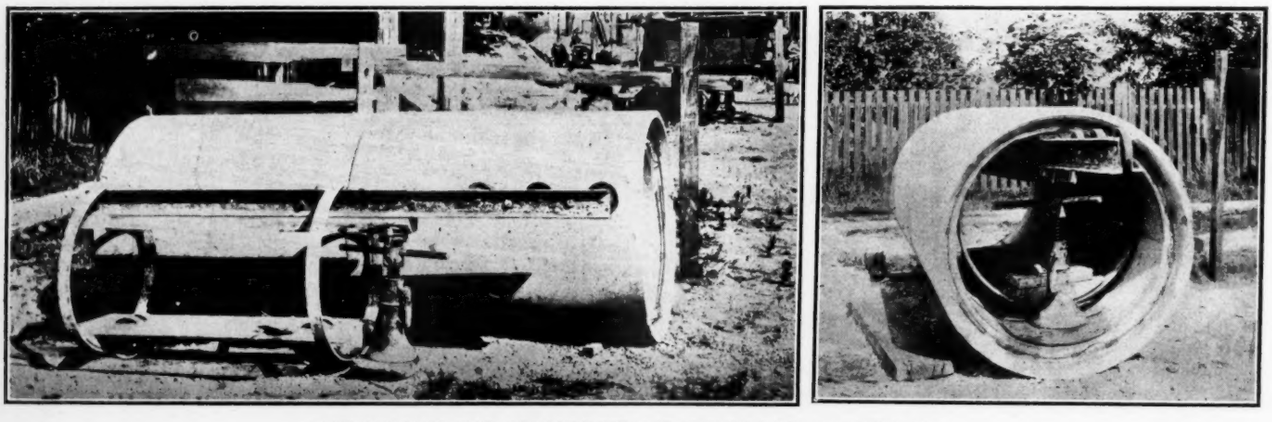
In laying heavy reinforced concrete pipes for sewer in tunnel in Vancouver, B. C., difficulty was found in setting the pipes and holding them to grade while the tunnel filling was being packed around them, because of the impossibility of lifting them from above, as is done in the case of laying such pipes in open trench. In order to overcome this difficulty, the special contrivance was designed which is shown in the accompanying illustrations. The pipes for which this was used were 30-inch lock-joint reinforced pipes weighing about 1,700 pounds each.

The contrivance consists of a carriage made of a top beam, two rings of angle iron about 28½ inches in diameter, and a small truck or platform supported by four wheels. This truck is at the bottom and supports the rings, and these in turn support the top beam. This beam consists of two 8-foot channels bolted together with a space between, in which space or slot are set three rollors near one end. A plank is fastened to the top of this beam with its top surface shaped to fit the inside of the pipe, and another plank to the bottom of the beam. The tops of the three rollers are in line with the top of the upper plank. In addition, there is an ordinary screw-jack, to the bottom of which is fitted a piece of hard wood shaped on the bottom to fit the inner surface of the pipe and supporting the jack inside the pipe.

The first pipe having been set and held in place by concrete packed under and around it, the carriage is run into this pipe, rolling on the wheels of the bottom truck, leaving about three feet of the top beam projecting. The jack is then placed inside the pipe near the forward end and by it the projecting beam or "horn" is raised to contact with the top of the pipe. Another length of pipe is brought through the tunnel into place on a small truck and is slid onto the "horn" over the rollers until it makes a close contact with the preceding pipe. As it hangs from the "horn," it can be raised or lowered to the exact position desired by turning the screw-jack. When adjusted exactly to line and grade, it is held suspended in this position while concrete is packed between the pipe and the bottom of the tunnel, and the joint between the two pipes is made. When the pipe has thus been solidly fixed in place, the jack head is lowered and the jack and carriage moved forward ready to lay the next length of pipe.

The jack is removed, but not necessarily the carriage, when it is necessary to admit a workman into the pipe to finish off the inside of the joints.

A. G. Dalzell, engineer of sewers at Vancouver, states that with this apparatus about 2,000 feet of 30-inch pipe has been laid in tunnel, and it has proved a great saver of both time and labor.



CONTRIVANCE FOR SETTING HEAVY SEWER PIPE IN TUNNEL.

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PROSPECTS FOR ROAD WORK.

About a week ago Buchanan county, Missouri, voted in the ratio of five to one in favor of a two-million-dollar bond issue for the construction of hard-surface highways; and it is reported that several other counties of the state are preparing to vote on similar programs. Voting bonds is not equivalent to selling them, of course; and even letting the contracts is not assurance that the roads will be built in these embargo times. But it shows that the people of one section of the country, at least, are in favor of building roads on a large scale in spite of the higher prices that will probably prevail. Casual inspection of recent issues of Municipal Journal, moreover, shows millions of dollars are to be spent by each of a considerable number of states, from California to Florida, including six or seven millions in Michigan.

As to contracting for paving work, our reports for the month just past show an average of twenty-five or more contracts a week definitely let—a good showing for so early in the season, the spring lettings generally numbering many times as great as the winter ones. Some of the contracts already let are for hundreds of thousands of dollars.

There is still doubt as to the conditions under which this work must be done. The priority order withholding all open freight cars from use for carrying road materials will not be in force, but preference will undoubtedly be given to coal, food and munitions for many weeks to come. There are indications, however, that several of the bureaus and officials at Washington are in favor of a road-building program of more than usual extent—accenting the word program. Logan Waller Page, director of the Office of Public Roads, has urged all the state highway departments to prepare a program listing each road in the order of its economic importance. If Secretary McAdoo (who will control the railway transportation of road materials, and possibly the issuing of bonds for road work as well) is convinced that the road work that it is desired to undertake all fits into a plan carefully considered with a view to increasing the transportation facilities of the country, it is difficult to believe that he will impose any obstacles to the carrying out of such plan.

But we believe that a plan or program will be insisted upon, and properly so. Building a stretch of road here and another there, each with no relation to the other or to any road system but chiefly to please the largest percentage of tax payers, as has so often been the practice, has no place in a country and a time in which every energy is being directed to rushing war preparations. Men, material or money used in such work is worse than wasted. On the other hand, road construction that furnishes continuous routes of good, hard-surface roads between traffic centers may easily double the traffic facilities of the country now furnished chiefly by the greatly over-burdened railroads.

The American Road Builders' Association, which meets in St. Louis next week, expects to discuss several papers dealing with topics bearing upon this subject, one of the most suggestive of the titles being "How to Lay Out and Justify a Program for War Roads." It is to be hoped that every state highway department will be represented at the convention, and that each representative will take home with him a determination to have a war road program adopted for his state and definite ideas as to how to prepare such a program; also that such arguments and influences may emanate from the convention at this, which would seem to be the psychological moment, as will secure for the several state programs the cooperation rather than the opposition of all Federal departments and officials.

KEEP THE ROADS OPEN.

There are still sections of the country (although they are not so numerous or extensive as formerly) where hub-deep, stiff clay mud in the roads is considered a dispensation of providence for which no road officials, state, county or town, hold themselves responsible, but farmers and other users must make the best of it, which often means abandoning all use of the road until it dries out. Such a condition is now considered a mark of deferred civilization.

But there are other roads in quite progressive communities which nature is permitted to render equally impassable to modern vehicles for days or weeks at a time because of snow too deep for wheels. If it is the duty of road officials or a road department to so maintain a road that it is not rendered impassable by mud, why is it not equally important that it be opened up after every snow storm and kept passable for trucks or other vehicles that need to use it?

Last week Michigan officials decided that the main roads in that state should be made passable at once and kept so, the attorney-general stating that the War Preparedness Board would pay at least half of the cost, the balance presumably to be borne by the counties. The meeting at which this was decided was called at Detroit by state highway commissioner Frank Rogers, because of the serious consequences to manufacturers of present conditions. On account of railroad freight congestion, auto manufacturers during the last few months have been delivering their cars overland. The heavy snows have rendered the roads almost impassable and one manufacturer stated that he would be compelled to close temporarily his plant, where 1,700 men are employed, unless the highways upon which he relied were made passable within a very few days.

There is a country-wide movement to use roads and

motor trucks for freight hauling, the amount of which exceeds the capacity of the railroads. If freight routes are established in the development of this idea, provision must be made for keeping such routes open winter as well as summer; for interruption of this service, once it has become established, will be as serious as that of the railroad freight service, and readers of the daily papers do not need to be told how serious a matter even partial interruption of that has been this winter.

This would seem to us to be an important duty of the highway department, state, county or local, as a part of its road maintenance. Whether or not maintenance funds could be used legally for this purpose we can not say; but if they can not, then the laws governing their expenditure should be changed to permit of such use. The danger to the road itself of ruts in the ice and snow covering it, and the periodic use of snow plows or scrapers to fill such ruts, were discussed by us a few weeks ago, and furnish an additional argument for including the cost of snow work in the maintenance budget.

COLD-WEATHER CONSTRUCTION OF CONCRETE ROADS.

Early spring (which will soon be here) and late fall are critical seasons for concrete pavements because of the danger that low temperature may damage them. A single freezing is not believed to be so injurious as several alternate freezings and thawings, and for this reason, and because during mid-winter there is less probability that such work will be undertaken, warnings against winter work are not so necessary. Prof. Duff A. Abrams, of Lewis Institute, Chicago, has given in the organ of the Portland Cement Association suggestions for constructing concrete roads when the temperature may occasionally fall below freezing, which are summarized below:

Concrete laid in cold weather should set rapidly in order to resist safely the destructive action of freezing, and aggregate containing dirt, especially organic impurities, will produce slow setting and weak concrete. Too much water also reduces strength and prolongs time of setting and furnishes surplus moisure for freezing in the body of the concrete. Use of frozen lumps of aggregate must be avoided. It is a good plan to heat piles of aggregate by steam from a road roller, which will be facilitated by covering the piles with canvas. Heating the mixing water gives valuable results at little expense. This can best be accomplished by inserting an improvised steam coil in the water pipe near the mixer, which coil is heated by a coal or wood fire.

If it is probable that the temperature will fall below freezing while the concrete is setting, the heat generated by the chemical reaction of setting should be retained. This may be accomplished by placing a covering of canvas or other material over the newly-laid concrete so as to leave an air space between the canvas and the concrete. If there is an extreme drop in temperature, pipes carrying live steam may be run under the canvas. When the concrete has partially hardened, straw or manure may be used to protect it, but the latter should not be placed in direct contact with the concrete because of the possible injury and discoloration that may result.

As concrete exposed to cold attains strength slowly, traffic should be excluded from concrete roads finished at low temperature, it being good practice to disregard, in estimating the setting time, each day during which the thermometer falls below freezing.

Of all chemicals used, calcium chloride and common salt probably give the best results. The former lowers the freezing point of the water, accelerates the setting of cement, and causes the generation of heat due to chemical reaction. If used to the extent of about three per cent by weight of the mixing water, it will enable concrete to be placed with the temperature several degrees below freezing with little danger of injury. It comes in crystal form and is readily soluble in water. Prof. Abrams suggests making a solution of 1½ pounds of calcium chloride per gallon of water and adding one gallon of this solution for each sack of cement used. The use of this material adds about three cents per square yard to the cost of the concrete.

Common salt lowers the freezing point of water, but does not compare favorably with calcium chloride in other respects. When used in quantities of about five per cent by weight of the mixing water, it has been found to prevent freezing at temperatures not lower than 28° Fahr. Its low cost is its principal advantage.

The writer recommends the above precautions in the order given. Heating the mixing water should not be relied upon to counteract the bad effects of dirty or poorly graded aggregates or excessive amounts of water. Generally the heating of concrete materials and protection of fresh concrete will be found most satisfactory. It is not usually desirable to rely solely upon the use of chemical compounds, but these should be used only in combination with the other precautions described.

ENGINEERING FOR DIRT ROADS.

The city engineer of Hutchinson, Kansas, in a paper before the Kansas Engineering Society, expressed his convictions of the value of care in locating and grading dirt roads. To illustrate, he cited the fact that last year he had been called upon to pave with brick a dirt road that he had constructed four years previous. He said that, in building this dirt road, "I ran levels over it, platted a profile and laid a grade line as carefully as if it were for a pavement; then set stakes and saw to it that the grading gang complied with the stakes for both line and grade, although I did not dream of ever paving it. But when that time did come all I had to do was to get the old profile out of the files, set stakes according to it, fill the chuck-holes and smooth it up a bit. We had a good solid foundation for the pavement, as it had been packed with several years of traffic and rain which packed it better than a heavy steam roller would do it. The cost of the engineering work done for the grading was probably five dollars, but it probably saved about $500 worth of excavating.

"We often hear the statement made that all the money spent in building and maintaining dirt roads is wasted. If such roads are not built to the exact line and grade of the pavement that is bound to come on our principal roads soon, that statement is correct; but, on the other hand, a more far-sighted policy should be adopted and the highway engineer be permitted and required to make a definite and final location of the center line of the earth road, to run levels over it and plat a profile, then carefully lay a grade line suitable for pavement; to use vertical curves instead of abrupt changes of grade and to provide for the drainage of the side ditches as well as the roadway.

"If there is a deep ravine extending across the road, he should put in a concrete culvert and make the fill necessary to bring the roadway up to the suitable height for a paved road, because several years' settling will do a ten-foot fill a lot of good, and a pavement laid on such an old fill will not crack from settlement.

"The highway engineer should have engineer assistants enough that he could keep an instrument man on the job to set stakes to the predetermined line and grade, and see that they are complied with.

"If this is done, the money spent on the construction of dirt roads will not be wasted, but will be invested in a foundation and sub-base for the ultimate hard surface."

The WEEK'S NEWS

Los Angeles Municipal Asphalt Plant—Washington Counties' Standardized Road Accounting—U. S. Public Health Service Seeks State Cooperation on Disease Control—Cleveland's Sewage Disposal Situation—Water-Waste Survey in Buffalo—Metering Cincinnati—New Orleans Raises Water Rates—New Hydro-Electric Development for Seattle—Port Newark Terminal Swept by Big Fire—Two Platoons in St. Paul—Waltham's New City Manager—Toronto Wants Municipal Railways—Jitneys in Portland, Ore.

ROADS AND PAVEMENTS

Los Angeles Paving Plant Profitable.

Los Angeles, Cal.—In reviewing the work of the city's municipal asphalt plant, the city engineer has made the following statement: "The municipal asphalt plant has been in operation since April, 1915. Since that date there has been produced 709,860 cubic feet of standard asphalt wearing surface at an average of 13.57 cents per foot, 16,240 cubic feet of bitulithic mixture at a cost of 11.57 cents per foot, and 29,230 cubic feet of binder mixture at a cost of 10.40 cents per foot. These figures include depreciation of and interest on plant and equipment, and 7½ per cent overhead administration. Assuming that the department could have purchased the material used since April 17, 1915, at a cost of 19 cents per cubic foot (the price paid under contract maturing about January 1, 1915), the operation of a municipally owned asphalt plant has netted the city a saving of $43,000."

Boulevard System to Encircle Tulsa.

Tulsa, Okla.—Work has been started on a boulevard system which is finally to encircle the city. A bond issue for this improvement was approved by the voters over three years ago, but was held up for a long time pending the approval of the attorney general. The boulevard system will be constructed by the city park board and will be under its supervision. It will be paved the entire length of almost eighteen miles.

New System of Road Accounting in Effect.

Olympia, Wash.—A system of cost accounting that will enable the different county engineers and commissions of the state to keep track of the cost of maintenance of all state and county roads and will furnish the state highway commissioner with data concerning maintenance cost each month for the primary permanent state highways is being established throughout the state in compliance with the highway act of the last legislature. Under the new county system the county engineers and commissioners are made agents of the highway board in maintaining the primary state highways within the county bounds. Rules and regulations for carrying on the state road maintenance work have been issued by the state board. In answer to the appeal of the highway board for more funds for the upkeep of the permanent state roads the last legislature turned all the maintenance work over to the counties and allotted the 7½ per cent of the highway fund, or $75,000, together with all the surplus of the motor vehicle fund, amounting to approximately $500,000 a year, to the counties to keep the state roads in condition. The county commissioners are bound to see that the state roads are in good shape. In case the state board finds any state road run down it has authority to give the county in which the road is located 15 days to commence repairs and in case of failure on the part of the county, the state board may step in, make the necessary repairs and charge the cost to the county's share of the road fund. The fall inspection made last year resulted in two counties being notified to make repairs. The highways law also specifies that if the counties do not find the allotment from the state sufficient to keep the permanent state highway in good condition, the permanent road construction fund may be drawn upon, and if that is not sufficient the funds are to be taken from the county road and bridge fund. When the law went into effect in June the state highway board made a set of rules and regulations to govern the maintenance work of the counties, but did not supply the cost accounting system. The board decided to let the county engineers make their monthly reports and from the reports compile a cost system to suit the case. As a result, the new cost accounting system will show the amount of money expended for every section of permanent state highway in every county. The cost reports will show the cost of maintenance of graveled road, concrete, bitulithic and other grades of construction and surfacing. The rules also require the county engineer before the end of December of each year to make out a road fund budget to show what he estimates the cost will be to keep up the state highway sections. The county commissioners at their first meeting in January pass on the budget, make any changes they desire and then adopt it, sending a copy to the state highway commissioner. The state commissioner may increase any of the items he wishes. A monthly report of the road maintenance cost also will be filed by the county engineer with the commissioners and a copy sent to the state office, where a complete record of all state highway expenditures, the cost per mile in each county for each type of highway will be made. With the new cost forms, state highway commissioner Allen sent out a complete list of instruction for carrying out the work. The cost of road maintenance will be segregated as patrol, drainage, dragging and dressing, clearing, removing obstructions, resurfacing and repair, sprinkling and sanding, structures, safeguards and signs, industrial insurance, equipment and supplies, supervision and contingencies.

SEWERAGE AND SANITATION

Asks State Cooperation in Disease Campaign.

Washington, D. C.—Surgeon-General Rupert Blue has sent the following letter to the health officers of all states after a preliminary telegram: "It is evident that the prevention of venereal infections in the military population is largely dependent on the degree with which these infections are prevented in the civil community. This imposes upon the civil health authorities the duty of forcefully attacking the venereal problem upon the basis of the control of communicable disease. There is forwarded you herewith an outline upon which it is proposed to make this attack. Manifestly, no plan which can be set forth at the present time can be complete in all its details nor can a plan be devised which, in all its phases, fits the requirements of each state exactly. Therefore, in the plan which I am sending you only the basic necessities have been stressed. Your co-operation in putting this plan in force is requested. The Public Health Service, in co-operation with the Red Cross and the Medical Department of the Army, is establishing venereal clinics in cities in immediate contiguity to the army cantonments. There is even greater need for the beginning of an active anti-venereal campaign in those cities which are outside of the military zones, but into which soldiers go in search of recreation. Most important of all, perhaps, is the thorough education of the general public to the end that this disease group will be considered in the same light as are the other communicable infections. This will permit the free and frank discussion of this important question without offense to modesty. I shall be pleased to have your views and suggestions as to the prosecution of further work along these lines. What-

ever is to be done must be initiated promptly if we are to prevent the next increment of the draft from having the high venereal rate of the last."

The memorandum accompanying the letters gives, among other suggested methods of quarantine, control, and cure of the disease:

Establishment of venereal clinics by health authorities.

(1) Federal, in zones in close contiguity to cantonments.

(2) State, in situations where local authorities refuse or fail to establish clinic.

(3) City, particularly those cities in which commercialized or clandestine prostitution flourishes for the patronage of soldiers but are beyond the authority of the Secretary of War.

(4) Country, in thickly settled rural communities.

By the creation of new or the utilization of existing hospital facilities:

(1) For the treatment of those who volunteer for treatment.

(2) For the obligatory treatment of persons under control of the courts.

By legal enactment:

(1) Declaring the venereal infections to be quarantinable.

(2) by substituting confinement to hospital for confinement to jail in the case of those convicted by courts and having venereal infections.

(3) By substituting remanding to a probation officer for the imposition of fines.

(4) To carry out (2) and (3) it is necessary that all persons arrested be examined by the city physician or other authorized person.

(5) By arrest of acknowledged and clandestine prostitutes by policewomen.

Relieve problem of all moral and social issues and place campaign solely on basis of control of communicable disease.

Propaganda of wisely conducted publicity:

(1) Through public meetings adddressed by forceful speakers.

(2) Through public prints.

(3) By placarding public toilets, placards to emphasize danger of venereal diseases, and to recommend prompt treatment either by competent physician or at the free venereal clinic.

(4) By follow-up work by social workers.

(5) By the education of infected persons—(a) by physicians in private practice; (b) by venereal clinic and hospital.

Ask Time Extension for Sewage Plant Completion.

Cleveland, O.—The city council has passed resolutions asking the state department of health for an extension of time in which to complete plants built to prevent the pollution of Lake Erie and Cuyahoga river. The state health department had ordered the city to install sewage works for preventing the pollution of the lake before Feb. 13, 1918. The city has already spent and has contracted for the expenditure of more than $700,000 for the construction of sewers and treatment works in accordance with the order. Because of delay in determining the legal status of a recent act of the legislature, which permitted the raising of the necessary funds authorized at a recent election and of much time consumed by necessary studies and investigations, the city asks extension of time until Feb. 13, 1920. In the case of the Cuyahoga river, the city had been originally ordered to stop pollution by July 1, 1915, and had then had the time extended to July 1, 1917, but now it requests a further extension until July 1, 1920.

Asks State Aid to Avert Smallpox Epidemic.

Erie, Pa.—Dr. John W. Wright, city health officer, has appealed to state and federal health authorities to assist him in combating a threatened epidemic of smallpox in Erie. The action followed discovery of a new case of smallpox—a negro workman, employed at the Erie Forge works, contracting the disease. Making every effort to save the city from an epidemic, Wright claimed his efforts are thwarted by the indifference of large employers of labor, who refuse to co-operate with him in the supervision of their workmen's health. These firms bring in stray labor from outside points, especially negroes, and, he claimed, they are permitted to live in insanitary surroundings with the result that at least one new case of smallpox is discovered daily. Dr. Wright is preparing plans to remedy the situation, and expects on the arrival of state and federal health authorities that drastic action will immediately be taken. Wholesale vaccinations of employees, quarantine measures and rigid supervision of their housing conditions will be put into effect. A smallpox epidemic in Erie at the present time would be extremely serious, Wright said. There is no place where a white patient could be cared for except to be quarantined in his home. The cases now being cared for are among negroes, and these are housed in tents.

WATER SUPPLY

To Complete Water-Waste Survey.

Buffalo, N. Y.—On the recommendation of commissioner Kreinheder council has authorized a complete survey of the city's water waste at a cost of about $44,000. The Pitometer Company of New York is to do the work along the plans followed by it in a partial survey made some time ago. George C. Andrews, water commissioner, estimates that the survey will result in an annual saving of $80,000 in coal bills and of about $40,000 in wages. The city has been divided into ten districts for the purposes of this survey, one of which has been covered. Two others will be completed in the spring.

All Water Services Must Be Metered by Consumers.

Cincinnati, O.—Eighteen thousand water consumers in the city who have been paying for their water under the "survey" rate plan will be affected by an order issued by William F. von Hoene, comptroller of the water works, to the effect that all people using water under this plan must install water meters. The city is districted into six sections, and the consumers in the first are ordered to have meters by July 1. Each succeeding district follows within a month of the preceding one, so that the sixth district must install meters by December 1.

Detroit Builds Experimental Filtration Plant.

Detroit, Mich.—An experimental filtration plant has been erected by the city, and the board of water commisioners has entered into contract with an engineer to conduct a series of tests lasting about nine months. The idea of the board taking these steps at this time is only to prepare for the future, commissioner Alexander Dow explained. It has no intention of establishing a filtration plant at present. R. Winthrop Pratt, Cleveland, has been engaged to conduct the work of the plant, which will consist of filtering Lake St. Clair water under all conditions during the winter, spring and summer seasons. The cost of the work will not exceed $15,000. When tests are completed, Mr. Dow said, the board would know how much it will cost to filter the water, how much water can be filtered under any and all conditions, and where would be the best location for a filter plant.

Increased Water Rates to Meet Costs.

New Orleans, La.—The sewerage and water board has found it necessary to get more revenue, owing to rising operating costs. Of the absolutely essential articles which the board uses in pumping and filtration, coal, coagulants, lead pipe, gasoline, etc., the cost during the present year is to be about $65,000 above what it was last. To this must be added, as part of the year's expenses, whatever the 10 per cent increase amounts to in the wages of employees who receive less than $200 a month, estimated at $60,000. To meet the cost of the increase in the two items—of supplies and wages—the board has rearranged its schedule of charges to yield approximately $90,000 a year. Under the present schedule a water bill is made up of a service charge, running from fifty cents to $1.25, according to the size of the premises, and a charge of ten cents per thousand gallons after one-third of the total consumption has been eliminated as free water for sewerage purposes. The board has decided to change the amount of free water from on-third to one-fourth of the total consumption, limiting such free water to 600 gallons per person on the premises. In the case of the small consumer, whose bill is from $1.50 to $1.80, it is estimated that this will amount to only a few cents per quarter. In the case, however, of the large consumers, who use water for garages, lawns, etc., the injustice of allowing them a third of their consumption for flushing when a large proportion of it is used for other purposes will be removed, and they will be made to pay on a basis of free water more nearly comparable with that for which the smaller consumer is charged. No change is to be made in the service charge nor in the rate per thousand gallons.

STREET LIGHTING AND POWER

City to Build Hydro-Electric Plant.

Seattle, Wash.—March 1 has been set as the date for the receipt of bids for the construction of the $5,000,000 hydro-electric power plant for the city on the Skagit river. The specifications have been recently changed. Instead of calling for a lump sum bid on the power plant and transmission line complete as originally contemplated separate bids will be taken on each of these items. In order to put all bidders on an equal basis the specifications will also assume a standard price for steel. Another change will increase the interest on the warrants from five per cent to six per cent and the transmission line towers will be changed from steel to wood. Time, the specifications state, will be the important factor in the contract. Contractors are requested to state their preference on cash or warrants in payment.

Consumer Must Pay for All Current in Contract.

Oakland, Cal.—Consumers of electric current are liable for full payment on minimum rate contracts whether or not they consume the amount contracted for, according to a decision made by justice of the peace Harry W. Pulcifer of Oakland in giving judgment to the Great Western Power company in its suit against the former lumber firm of Clark & Gallagher. According to the testimony in the case the consumers agreed to take $30 worth of electric power each month for twelve months. But this minimum amount was not consumed during the period of the contract and in settling their accounts the firm paid for the power actually used by them. The power company claimed a balance of $253.45 at the rate of $30 a month and filed suit. "This is plainly a case wherein the power company is entitled to protection in the distribution of its commodity," said judge Pulcifer. "The company is bound to furnish a certain amount of power and must make adequate provision therefor each year, based upon its probable consumption and existing contracts. It would be unjust that this expense should be undertaken if the consumer should be relieved from his responsibility."

FIRE AND POLICE

$1,500,000 Blaze Sweeps Port Newark Terminal.

Newark, N. J.—What is believed to be part of a nation-wide plot to destroy shipyards, docks and war plants was a fire which swept over the new city dock at Port Newark Terminal and for hours menaced the city of wooden and concrete shacks, warehouses and work buildings that constitute the United States Quartermaster Department supply depot and the Submarine Boat Corporation shipyard. Besides the dock itself, which cost $750,000 to build, and much railroad trackage, eight barges and one scow, loaded with materials, were destroyed. Unofficial estimates of the total damage began at a minimum of $1,500,000. While up to noon not a building, either at the supply depot or shipyard, had been even singed, the fire, driven by a brisk west wind straight down the ship channel and dock, was within 200 feet of the nearest shipway. The ways, parallel to the dock, extend into the bay at right angles, and number 28, stretching north from the dock. The work of the fire-fighters in dynamiting part of the dock saved them. Four of six boats from which firemen were directing streams were bunched between the fire and the ways, directing all efforts to stopping the progress of the flames. Captain Edward J. Worth, of the New York marine fire department, commanded the battery of fire boats. Chief Moore, of Newark, said that the danger of the fire lay in the fact that it was spreading, and had spread for hours, beneath the dock. When efforts hours before dawn to check the fire's spread by fighting it from land failed, chief Moore of Newark sent for the boats. To aid the ships 200 workmen, laboring under direction of the firemen, ripped up the planking of the dock near the ways so that firemen could get water to the timbers beneath. A steam crane, run up close to the flames, aided in this work. Authorities at the terminal were on the watch for the very disaster that came. Several days before a detachment of coast guard regulars was stationed at the plant. Men of this company told of a fight in the dark with an armed man who fired upon them from the roof of a shed not fifty yards away from the spot where the fire started. The warnings that had come to them, officers and soldiers said, was that the plant was to "go" between the 19th and 21st. Whence these warnings came they could not say, although it is believed the secret service gave them. Governor Edge only the previous day issued a general fire warning to cities of the state where munitions and war plants are located. Two oil barges moored at the head of the ship channel gave the fire impetus within a few minutes after its discovery. The burning oil, spreading over the ice, set fire to the dock for a distance of 200 yards. The flames, whipped into great red pennons by the wind, were plainly visible from the city, and close at hand were of appalling proportions. Engines No. 14 and 24, which were among the first to arrive, were overwhelmed within half an hour by the flames and smoke. Their crews abandoned them until a slight shift in the wind made the positions once more tenable.

Washington, D. C.—A mysterious letter warning President Wilson of a nation-wide plot to destroy docks and war plants is being used in connection with investigation of the Newark fire. The letter in question declared the plot was to go into effect January 22. Following receipt of the warning, home guards at different points were mobilized to stand guard by vital plants. Whether the plotters were forewarned or not is not known, but at any rate the alleged conspiracy was not in action on the date originally set. Then came the series of fires that revived the charges as to a plot. The fires, started almost simultaneously at Newark, Buffalo and Baltimore, destroying hundreds of thousands of dollars in property, led officials here to believe that there is a widespread movement afield to concentrate enemy action on America's war plants and docks.

Fire Destroys Pumping Plant.

Greybull, Wyo.—The city's old pumping station has been destroyed by fire. When the alarm was given the tank was found empty. The building was a complete loss. The machinist succeeded in getting one of the pumps started. No trace has been found of how the fire originated. The new building, at the time being erected, is about completed and the other pump will be working soon.

Two-Platoon System in Effect.

St. Paul, Minn.—With nearly 500 of the necessary 530 men available, St. Paul's fire department has been placed on the two-platoon system. According to a statement by commissioner McColl, "We have sufficient certified men to make a good start and a week should find the new system working throughout the city. Where there is a deficit of certified men we will place temporary men. These workers will not be required to purchase uniforms until their appointments are made permanent." Under the new system, men work alternate two weeks on the day and night shifts. The day men work from 8 a. m. to 6 p. m. This will necessitate their taking their lunches with them in the morning. Night men will work from 6 p. m. to 8 a. m., sleeping at the fire stations.

Firemen Receive Wage Increases.

Joplin, Mo.—The city's firemen are greatly pleased over the favorable settlement with the mayor and council of the wage question. Formerly firemen entered the service at $70 and after a year received $80. They were given one day off in five. There were 35 men in the service. Under the new arrangement the wage will be $75, $80, $85 and $90. The firemen will receive one day off in eight, and the number in the service is to be reduced to 32 men. This will not mean that any firemen now employed will lose his position. Already there are three vacancies, and in order to keep the number at 32 mayor Poole will neglect to make new appointments. At the last conference of the mayor

and members of the department it was explained that it would be utterly impossible for the city to meet the demands of the firemen for an increase from $80 to $90 unless there could be a reduction in the number of men employed and also a reduction in the time off duty.

Withdraws Fire Protection Outside City Limits.

Canton, O.—Fire chief Mesnar has announced that as a result of the failure of the citizens of North Industry to pay to the city of Canton $50 charged against the village for services at a fire several months ago he would advise the residents of the village to provide a fund for this purpose if they expect the Canton fire department to answer calls in the future to aid in fires there. Mesnar said that when the citizens failed to meet the charge which is made by the city for all assistance rendered to towns outside Canton, the owner of the block which burned came to him and paid $40 of the $50 due.

Gasoline Leak and Lighted Lamp Cause Big Blaze.

Norfolk, Va.—A two-story brick garage was destroyed here, together with more than thirty automobiles and trucks, in a fire which was caused by a negro holding a lighted lamp near the drip from an automobile fuel tank. The damage totaled $100,000. Within a hundred yards of the scene of the blaze is a big Du Pont warehouse. The fire spread quickly through the building and it was in full blaze when the firemen arrived. Two early explosions of a minor nature scattered the blaze and the walls crumbled to the ground very quickly. Employees of the garage were successful in removing but one machine. There was little the firemen could do but prevent spread of the flames to the adjoining building. A detachment of sailors was sent over from the navy yard and they were of material assistance to the firemen in preventing spread of the flames.

GOVERNMENT AND FINANCE

Manager Goes from One Massachusetts City to Another.

Waltham, Mass.—Clarence A. Bingham, city manager of Norwood, Mass., has been unanimously appointed city manager of this city by the council. He will assume his duties on April 1, under the plan D charter. His term is unlimited and he is to receive a salary of $5,000 a year. On April 1, 1915, Mr. Bingham was appointed town manager at Norwood. He was among the speakers from Norwood who told of the working of the town manager form at meetings here when the change in government was being agitated. Mr. Bingham was born in Elizabeth, N. J., and he is thirty-two years old. He was graduated from Rutgers college in 1906. For a period of three years he was assistant city engineer at Elizabeth and he subsequently engaged in engineering work with the Pennsylvania R. R., the Lehigh Valley R. R. and in other similar positions.

Wife Takes Seat of Dead Alderman.

Troy, N. Y.—The first woman member of a common council body in the state took her seat at the organization meeting of the Troy board of aldermen. The representative is Mrs. Patrick J. Kennedy, of the fifth ward, and she takes the place to which her late husband was elected in November last. The mayor filled the vacancy.

May Not Withdraw Improvement District Signatures.

Nashville, Ark.—The supreme court of Arkansas has handed down a decision refusing to allow the withdrawal of a petitioner's name from a petition for an improvement district after he has decided that the district is not advisable. Two improvement districts had been proposed for the city, one calling for a sewer district and the other for the construction of waterworks. The plaintiff endeavored to have the district invalidated after the city council, acting on the original petitions, had created them. In support of this contention, it was claimed that several of the signers of the original petitions sought, before the matter was finally settled by the council, to have their names removed on the ground that the time is now inopportune to form such districts and that the burden of taxation would be too heavy. The supreme court held that the names could not be withdrawn on the grounds presented, inasmuch as the questions raised should have been fully considered before the petitioners affixed their signatures to the original petitions. The further ground was held that any action to invalidate the district should have been taken within thirty days after the passage of the ordinance creating the district in accordance with the provisions of the statutes. Both districts were declared valid.

TRAFFIC AND TRANSPORTATION

Canadian City Votes for Municipal Railway Ownership.

Toronto, Ont.—The taxpaying voters of the city at a recent election voted in favor of the acquisition by the city of the Toronto railway system in 1921. At that time the thirty-year franchise in force at present will expire. The vote gave an overwhelming majority in favor of the proposition, about 39,000 to 3,700.

Owl Fare Case Lost by Company.

Pittsburgh, Pa.—The supreme court has handed down a decision at Philadelphia which upholds the superior court, which recently decided that the Pittsburgh railways had not given sufficient time before inaugurating a ten-cent night fare. The superior court upheld the state public service commission in its decision that the company could not increase its fares at night on the ground that it had not given the public proper notice of the proposed change. No opinion was expressed either by the commission or the court in regard to the authorization of an increase in rates.

Permanent Injunction Against Jitneys.

Portland, Ore.—United States district judge Neterer, in Seattle, Wash., has made permanent the temporary injunction issued on the application of the Puget Sound Traction, Light & Power Company restraining about 190 jitney operators from operating jitney buses in competition with the cars of the company. The validity of the temporary injunction was attacked chiefly on the ground that the defendants claimed not to be acting as common carriers, and that, therefore, they did not come within the provisions of the law passed by the last legislature requiring jitney owners to furnish indemnity bonds. In disposing of this contention, as well as the claim of the defendants that they are operating "free buses," judge Neterer said that the purpose of the law requiring jitney operators to furnish bonds was to protect the public against irresponsible operators, and that the act, therefore, must relate to all engaged in like business. Judge Neterer said: "The defendants are not operating 'free buses.' Operating a jitney is one of the sources of income and is employment for private gain. A card on the windshield on the outward side of which appears 'free bus' and on the inward side of which appears 'contributions received for defense fund against the traction company' is clearly a subterfuge, and will not excuse the defendants from compliance with the provisions of the act. It is an evasion which the law will not countenance. The law may be very undesirable. The motive which inspired it may have been unworthy. The wisdom of the law or the motive which inspired it are not matters for judicial termination on this trial. This court is merely concerned with the law as it relates to the facts presented. The defendants are not prohibited from operating jitneys. They are merely required to comply with a regulatory statute which has been held by the supreme court of the state to be constitutional." In concluding his opinion, judge Neterer said that while the evidence shows that the plaintiff company has been damaged by reason of the acts of the defendants, there was no testimony upon which the court could base the amount of damages, except upon conjecture and surmise, and he, therefore, directed the entry of an order awarding nominal damages to the plaintiff company.

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

Feb. 4.—OREGON SOCIETY OF ENGINEERS. Annual meeting, Portland, Ore. Secretary, Orrin S. Stanley.

Feb. 4-7.—AMERICAN ROAD BUILDERS' ASSOCIATION. Fifteenth annual convention, Hotel Statler, St. Louis, Mo. Secretary, E. L. Powers, 150 Nassau street, New York City.

Feb. 7-9.—AMERICAN CONCRETE INSTITUTE. Annual convention, La Salle Hotel, Chicago, Ill. Secretary, H. B. Alvord, 27 School street, Boston, Mass.

Feb. 8-9.—AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Sherman Hotel, Chicago, Ill. Secretary, J. H. Libberton, 208 S. LaSalle street, Chicago.

Feb. 15.—NEW JERSEY SEWAGE WORKS ASSOCIATION. Annual meeting, State House, Trenton, N. J. Secretary-treasurer, Frederick T. Parker, Guarantee Trust Bldg., Atlantic City, N. J.

Feb. 20.—CAROLINA ASSOCIATION OF HIGHWAY ENGINEERS. First meeting, Chapel Hill, N. C. Secretary, N. S. Mullican, county highway engineer, Lexington, N. C.

Feb. 21, 22.—NORTH DAKOTA SOCIETY OF ENGINEERS. Tenth annual convention, Fargo, N. D. President, J. A. Ingram, Grand Forks.

Feb. 22.—MINNESOTA JOINT ENGINEERING BOARD. Annual meeting, Duluth, Minn.

Feb. 22.—MINNESOTA SURVEYORS' AND ENGINEERS' SOCIETY. Annual convention, Duluth, Minn.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d street, New York, N. Y.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

American Road Builders' Association.

The program of the fifteenth annual convention of the American Road Builders' Association, to be held at the Hotel Statler, St. Louis, Mo., February 4 to 7, will be as follows:

On Monday morning, at the first session, formal addresses of welcome will be delivered by Governor Fred D. Gardner, for the state; Major Henry W. Kiel, for the city; President Jackson Johnson, for the St. Louis Chamber of Commerce, and Secretary A. C. McKibbin, for the state highway board. President H. E. Breed will reply for the association.

At the afternoon session the following papers will be read: "Traffic Laws in Relation to Highway Maintenance and Construction," by W. A. McLean, deputy ministe of highways, Province of Ontario. The discussion will be led by W. Leroy Ulrich, superintendent of repairs, Connecticut state highway department. "Illinois Scheme of Financing by Bond Issue," by S. E. Bradt, superintendent of highways, division of highways, Illinois Department of Public Works and Buildings.

At the evening session, at 7:30 p. m., "Roads in the Hudson River District with Unusual Construction Features" will be the title of an illustrated talk on Palisades Pard Roads, the Hendrick Hudson Drive and the Storm King Road, by W. A. Welch, chief engineer, Palisades Interstate Park Commission. There will then be shown pictures of war roads, three reels depicting the movements of the British army in France.

On Tuesday the session will open at 9:30 a. m. with "The Highway and Its Relation to Transportation," by S. M. Williams, sales manager, Garford Motor Truck Co. There will then be presented: "The Delivery of the Motor Truck from the Factory to the Seaboard Under Its Own Powers," by Raymond Beck, of the Highways Transport Committee, and "The Efficiency of the Motor Truck in Terms of Cost Per Ton-Mile," by R. E. Chamberlain, manager of motor truck sales, Packard Motor Car Co.

The fifth session, in the afternoon, will include: "How to Lay Out and Justify a Program for War Roads," by George C. Diehl, county engineer, Erie county, New York, and chairman of the Good Roads Board of the American Automobile Association, and "The Creation of a More Equitable Contract Between Highway Commissions and Contractors," by J. C. Travilla, consulting highway engineer, St. Louis, Mo.

In the evening, at 7:30 p. m., there will be an entertainment and smoker in the Hotel Statler, to which admission will be by badge.

At the sixth session, Wednesday morning, will be read: "New Features in Brick, Wood Block and Stone Block pavements," by Clifford Older, chief highway engineer, division of highways, Illinois Department of Public Works and Buildings (discussion led by Clinton Fisk, chief engineer of construction, city of St. Louis); "Short Cuts in Contracting and the Use of Labor Saving Machinery," by A. J. Rockwood, contractor, Rochester, N. Y. (discussion led by F. E. Ellis, contractor, manager of the Essex Trap Rock & Construction Co., Melrose, Mass.)

The afternoon will be devoted to trips about the city of St. Louis and visits to points of interest, while in the evening the annual subscription dinner will be held in the Hotel Statler.

The next session, Thursday morning, will take up "New Features in the Design and Construction of Bituminous Roads and Treatments and Cement Concrete Roads and Pavements," by Charles M. Upham, chief engineer, Delaware state highway commission. The discussion will be led by A. B. Dunning, chief engineer, Constructing Quartermaster, Fort Oglethorpe, Ga.

The eighth session, in the afternoon, will discuss "New Features in the Maintenance and Reconstruction and Repair of Earth, Sand-Clay, Gravel, Water-Bound Macadam and Bituminous Roads, Penetration Method," by Alexander W. Graham, state highway engineer of Missouri.

At the final session, 7:30 p. m. Thursday, will be presented two papers on "Road Construction in the Northeast Cantonments," by Philip P. Sharples, manager, General Tarvia department, the Barrett Company, and "Road Construction in Other Cantonments," by A. N. Johnson, consulting engineer, Portland Cement Association.

United Engineering Society.

At the annual meeting of the trustees of the United Engineering Society, January 25, the following officers were elected for the ensuing year: President, Charles F. Rand, American Institute of Mining Engineers; first vice-president, Calvert Townley, American Institute of Electrical Engineers; second vice-president, Robert M. Dixon, American Society of Mechanical Engineers; treasurer, Dr. Joseph Struthers, American Institute of Mining Engineers; secretary, Alfred D. Flinn, American Society of Civil Engineers; chairman, finance committee, J. Vipond Davies, American Society of Civil Engineers.

New England Water Works Association

Following the letter ballot, it has been announced that the candidates for office nominated by the nominating committee have been elected. The officers of the New England Water Works Association are therefore: President, Carleton E. Davis, chief, Bureau of Water, Philadelphia; secretary, Willard Kent, Narragansett Pier, R. I., and editor, Henry A. Symonds, Boston.

Albert Pike Highway Association.

About 400 delegates were present at the convention of the Albert Pike Highway Association, held in Fort Smith, Ark., January 10 and 11. The association's object is the construction of a hard surface road from Hot Springs, Ark., to Colorado Springs, Colo.

The road building program of the states of Missouri, Oklahoma, Colorado and Arkansas were outlined at the afternoon and night sessions of the first day by E. L. Sanford, of Springfield, Mo., a member of the state highway commission of that state; Max L. Cunningham, state highway engineer of Oklahoma; Hugh H. Carter, state highway engineer of Arkansas, and Thomas Tynan, superintendent of the Colorado penitentiary. The latter address was illustrated with moving pictures and views of the convict road camps and the sections through which the convicts had built roads, both before the work began and after it was completed.

On Friday morning Governor Charles H. Brough of Arkansas delivered an address on road conditions in the state. J. D. Fauntleroy, Ft. Worth, Texas, engineer of the sixth federal aid district, read an instructive

paper on "Maintenance of Roads." Resolutions were passed affirming the loyalty of the members and advocating the use of convict labor on highway work.

Closing addresses were made by Judge Cleveland Holland of Ft. Smith, George Callahan of Hot Springs and Secretary Guthrey of the Tulsa Chamber of Commerce.

The association closed its convention after re-electing Cyrus S. Avery of Tulsa, Okla., president and E. Bee Guthrey of Tulsa secretary. Enid, Okla., was voted the 1919 convention city. Every state in the association changed its vice-president, the new vice-presidents being A. J. Lawton, Colorado; H. P. McCausland, Kansas; H. E. Noble, Oklahoma; George A. Callahan, Arkansas.

North Dakota Society of Engineers.

The tenth annual convention of the North Dakota Society of Engineers will be held at Fargo through Thursday and Friday, February 21 and 22. The program includes regular reports and special discussions on municipal improvements, specifications, roads, drainage, concrete, lignite mining and fuel distribution, the engineer's part in the war, the engineer's position as a citizen, and other topics of interest and importance to the members.

The president of the society is J. A. Ingram, Grand Forks, and the secretary is E. F. Chandler, state university.

Virginia Good Roads Association.

About three hundred delegates were present at the opening meeting of the Virginia Good Roads Association's seventh annual convention, held in Richmond, January 15 to 17. One of the most important subjects considered was that of getting the legislature to provide funds for constructing the 3,500-mile system of roads reported by the legislative road committee.

The convention was opened by an address on the "Effect of the War on Road Improvements" by H. F. Bishop, district engineer, U. S. Office of Public Roads, which was discussed by F. D. Henley.

The two papers presented at the afternoon session were: "The Farmers and Road Improvement," by A. B. Thornhill, president, Virginia Division, Farmers' Educational and Cooperative Union, and "Highway Legislation in Virginia," by G. P. Coleman, state highway commissioner.

The Wednesday morning session featured papers by Harris Hart, superintendent-elect of public instruction, on "Effect of Road Improvement on the Public Schools," and C. O'Connor Goolrick, chairman, on "Work of the Legislative Road Committee."

In the afternoon, S. L. Von Gemmingen, engineer of maintenance, spoke on "Highway Maintenance in Virginia," and H. G. Shirley, chief engineer, Maryland State Roads Commis-

(*Continued on page* 104.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Buffalo, N. Y., is to have completed a SURVEY of WATER WASTE, which has been started by the Pitometer Company.

A WATERWORKS SYSTEM is to be built by Glassport, Pa. Plans are in course of preparation by the consulting engineer, Leo Hudson.

SANITARY SEWERS are to be built by Lake City, Ia., plans and specifications for the work having been prepared by the engineer, C. H. Currie.

A WATER SYSTEM is contemplated by Red Fork, Okla. Plans and specifications for the work have been completed by the Hughes Engineering Company.

A SEWAGE DISPOSAL PLANT and SEWERS are to be built by Marcus, Ia. Plans and specifications for the improvements were the work of R. W. Moore.

A SEWAGE DISPOSAL PLANT is to be built by Parsons, Kans. The engineers, Black & Veatch, are drawing preliminary plans for the improvement.

The WATER SYSTEM of South Milwaukee, Wis., is to be extended. The city is having plans for the improvement prepared by the Caldwell Engineering Company.

Texarkana, Ark.-Tex., is to build a joint SEWAGE DISPOSAL PLANT. The city has retained as consulting engineer L. T. Peden.

WHARVES and DOCKS are to be built by Pascagoula, Miss. The city is having plans for the improvement prepared by T. W. Nicol.

Lodi, N. J., is to improve its WATERWORKS. The city's consulting engineer is Thomas F. Bowe.

Tipton, Kans., is to construct WATERWORKS, bids having been called for. Plans for the work were by the consulting engineer, G. P. Taylor.

The WATERWORKS SYSTEM of Mitchell, S. D., is to be rehabilitated and a new supply developed at a cost of about $125,000. Plans and specifications are being prepared by the consulting engineering firm of Burns & McDonnell.

An experimental FILTRATION PLANT has been built by Detroit, Mich., in order to determine operating costs and conditions in case a plant is built by the city in the future. R. Winthrop Pratt, consulting engineer, has been retained to conduct a series of experiments for a period of nine months.

PERSONALS

Mayor-elect Sherman Cutshall, Ft. Wayne, Ind., has announced the following appointments: City attorney, Creighton H. Williams; board of works, John O. Brown, chairman, Andrew T. Anderson and Dr. C. L. Baird; the board of safety, B. Frank Sarver, chairman, J. Bert Mills and W. G. Berdelman; the board of health, Dr. Eric Crull, chairman, Dr. A. L. Schneider and Dr. A. J. Kessler.

Hall, William B., formerly city engineer of Oconto, Wis., is now a major in the 150th Machine Gun Battalion, and is now in France.

Mayor-elect Charles R. Hunter, Terre Haute, Ind., has appointed the following new officials: John Beattie, police chief; Carl E. Evinger, chief of the fire department; Carl Gott, street commissioner.

Jewett, Charles W., new mayor of Indianapolis, Ind., has made the following appointments: City controller, Robert H. Bryson, and city purchasing agent, Dwight S. Ritter. He has recommended George V. Coffin for chief of police and John C. Loucks for fire chief. He has appointed Alexander L. Taggart, Felix M. McWhirter and Jacob H. Hilkene to the board of public safety. Mr. Hilkene was formerly for four years city building inspector and before that he was foreman at the factory of Hetherington & Berner, makers of asphalt plants.

Potter, Alexander, has been retained by the United States Government to act as consulting engineer in the design and construction of the sewerage, drainage and water supply systems for the new Government explosives plant to be located near Charleston, W. Va., upon which will be expended a total of sixty million dollars.

City manager Bates, Portsmouth, Va., has appointed the following: George C. Stanley, jr., chief of fire department; James M. Broughton, chief of police; George F. Mathews, city electrician and assistant building inspector; Paul Whitehurst, chief engineer of sewage pumping station; J. H. Fleming, superintendent of street cleaning and garbage removal.

The following are new officials:

Sheridan, Wyo.—Mayor, M. B. Camplin; commissioners, Harry Loucks and W. Birkhaeuser.

Newport, Ky.—Mayor and commissioner of affairs, T. J. Livingston; vice-mayor and commissioner of finance, C. D. McCrea; commissioner of public works, Joseph Hermann; commissioner of public property, Christian Ebert, and commissioner of public safety, Daniel Riedel.

Yonkers, N. Y.—Commissioner of public works, Thomas H. Lee; city engineer, Lawrence Griffith; commissioner of public safety, Walter B. J. Mitchell.

Walla Walla, Wash.—Mayor and commissioner of police and public safety, I. F. Powell; commissioner of finance and accounting, A. K. Dice;

(*Continued on page* 104.)

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

HIGHWAY DANGER SIGNAL.

Automatic Operation and Novel Design.

The automatic highway danger signal shown in the accompanying illustration makes use of a principle hiteherto unused in the design of warning signs. The signal operates on the principle of angular reflection, and requires neither electric nor oil lamps.

It is constructed in such a manner that at night it will return red rays of light to an approaching automobile driver, regardless of his position on the roadway. It may be focussed in such a manner that at a point of from one hundred to one thousand feet the signal will appear in the form of a big ball of fire, instantly and unfailingly warning of the danger point ahead. It is claimed that the signal may be operated for at least ten years without the need of maintenance costs.

The signal case is made of heavy gauge, hot galvanized steel, which is

AUTOMATIC HIGHWAY SIGNAL.
(Note Square Red Reflecting Lens.)

12 inches square and 3 inches deep. This case contains the colored glass lens, 5/16 of an inch thick. Upon the signal case is mounted the "danger" sign, which is 22 inches long by 6 inches wide, black electro-galvanized. The embossed letters are covered with a luminous silver lustre coating. The signal case is mounted on a high carbon steel, electro-galvanized post, 2⅜ inches in diameter and 6 feet long. It has a universal knuckle-joint for adjusting the radius of the lens. The post is driven into the ground immediately beside the roadway to a depth of 32 inches from the road level.

This signal has been found effective for warning any moving vehicle carrying lights. It is installed at embankments, grade crossings, dangerous curves, etc. It is not affected by adverse weather conditions or sudden cutting off of electric current.

This signal has been endorsed and purchased by Mr. Batchelder, executive secretary of the American Automobile Association, Washington, D. C., and by many county commissioners and city officials. The Northern Ohio Traction and Light Company, Arkon, O., recently adopted this signal as its standard warning device for grade crossings. It has been found very successful at a dangerous turn at Rocky River by Fred H. Caley, secretary of the big Cleveland Automobile Club.

The signal is made by the Automatic Signal and Sign Company, Canton, O.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain constant. Quotations: Chicago, 4-inch, class B and heavier, $57.30; 6-inch, $54.30. New York, 4-inch, class B and heavier, $58.35; 6-inch, $55.35; 3-inch, $65.35. Birmingham, 4-inch, class B and heavier, $52; 6-inch, $49; class A $1 extra.

The Highway Industries Association.

The significance of the organization meeting of the Highway Industries Association, which, for the first time, brings together all industries directly interested in the use and construction of highways, has been widely recognized. It was estimated that the 155 delegates present represented 1,500 separate plants, with a combined capital of $400,000,000.

The meeting was addressed by James I. Blakeslee, fourth assistant postmaster-general, who is in charge of the rural delivery system, on the proposed motor truck transportation plan.

The following officers were elected: President, S. M. Williams, Lima, O.; 1st vice-president, A. R. Hirst, Madison, Wis.; 2d vice-president, Lion Gardner, New York, N. Y.; 3d vice-president, S. T. Henry, Washington, D. C. The secretary and treasurer will be appointed by the board of directors.

The constitution adopted recognizes three classes of membership. (a) Organization; (b) Company; (c) Associate; (d) Subscribing. An organization member shall be a national association, composed of companies, firms or individuals, whose business interests embrace the construction or use of public highways. A company member shall be a company, firm or individual whose business interests embrace the construction or use of public highways. An associate member shall be an association or civic body not eligible for membership as heretofore provided and who may desire to co-operate with this association. Associate members shall have all the privileges of membership except the right to vote. A subscribing member shall be any one eligible to any of the other classes of membership. Subscribing members shall have all of the privileges of membership except the right to vote. The membership of any member may be terminated at any time by resignation or by action of the board of directors for cause to them considered sufficient. A member shall remain liable for all unpaid dues payable before such termination of membership. The annual dues for a member of Class A and Class B membership shall be $100, payable at the time of becoming a member and on the first day of January in each year following. There shall be no dues for a Class C membership. Class A, B and C members may subscribe for additional memberships in Class D, with annual dues of $100, payable at the time of becoming a member and on the first day of January in each year following.

Each national association will elect one representative for director of the Highway Industries Association. Company, firm or individual membership will elect one director for every fifty members.

Among the associations represented were: National Association of Road Machinery Manufacturers, Portland Cement Association, Sewer Pipe Manufacturers' Association, the Macadam Association, Wisconsin Crushed Stone Association, Southern Paving Brick Manufacturers' Association, National Automobile Chamber of Commerce, Michigan Concrete Roads Association, American Association of State Highway Officials, Motor Accessories Manufacturers' Association, National Paving Brick Manufacturers' Association, American Automobile Association, Greater Iowa Association, Ohio Good Roads Federation, National Association of Sand and Gravel Producers, Western Paving and Brick Manufacturers' Association, National Association of Asphalt Block Manufacturers, National Crushed Stone Association.

Present headquarters are temporarily located at Lima, but may be moved to Washington, due to war conditions. Permanent headquarters may be located at Chicago or Cleveland.

R. J. DeLong, 516 Anthony street, Williamsport, Pa., in addition to being engaged in a general contracting business, is operating a coal yard, and expects to carry a full line of sewer pipe,

cement, reinforcing steel, expansion joints, and other construction materials. He desires price lists, catalogues and other information.

The Ransome-Leach Company, with executive offices at 115 Broadway, New York, N. Y., has been formed by the combination of the **Ransome Concrete Machinery Co.** and the **Oshkosh Manufacturing Co.,** of Oshkosh, Wis. This combination will be in a position to handle the western trade from the Oshkosh factory and the eastern trade from the Dunellen, N. J., factory. In addition the Oshkosh Manufacturing Co. makes the well-known "Ever-ready" sawing and wood-working machinery, which has been added to the line. Duplication of manufacturing and selling will be eliminated. One large warehouse will be established in every principal city, at which a stock of equipment will be ready for immediate deliveries. A full line of trench pumps, back fillers and material elevators has been added. The new combined catalogue of the company will be issued shortly.

The American-La France Fire Engine Co., Inc., Elmira, N. Y., has published edition No. 5 of its comprehensive catalogue of fire protection equipment and fire department supplies. The book covers the field completely and is fully illustrated. The arrangement makes the catalogue very convenient for ordering. The catalogue is divided into six sections: Fire station and apparatus equipment; lanterns, searchlights, etc., oil and electric; tools, tool holders, general equipment; gongs and bells, fire signals; fire hose and connections; play pipes and nozzles; hose racks, rolls and two-wheel hose carts; hand fire extinguishers and larger types of chemical apparatus; firemen's clothing and equipment; "safety-first" equipment. This encyclopedia of fire department needs should prove valuable on the desk of every mayor, city manager, councilman, fire commissioner, fire chief and purchasing agent.

Record Portland Cement Production for 1917.

The year 1917 holds the record for production of Portland cement, a total of approximately 93,554,000 barrels having been manufactured, an excess over the former high production of 1913 of nearly 1,500,000 barrels, and over the production of 1916 of more than 2,000,000 barrels, or 2.2 per cent. The shipments in 1917 of approximately 90,630,000 barrels fell below those of the record year, 1916, by nearly 4,000,000 barrels, or about 4 per cent. Stocks at mills increased more than 2,800,000 barrels, or 33.7 per cent, as compared with 1916.

Higher prices for cement prevailed throughout the United States except at a few plants in the Pacific Coast district. Higher prices were, however, accompanied by higher costs of manufacture. Demand for cement was generally very good during the first five to eight months of 1917, but showed a decided falling off during the remainder of the year. Labor and traffic conditions were, for the most part, unsatisfactory.

Three new plants reported the production of Portland cement in 1917: the Hercules, at Stockertown, Pa., the Fort Dodge, at Gilmore City, Iowa, and the Beaver, at Gold Hill, Ore., and one plant, the Giant, at Norfolk, Va., resumed operations after an idleness of several years.

The statistics were compiled under the direction of Ernest F. Burchard, of the United States Geological Survey, Department of the Interior.

NEWS OF THE SOCIETIES

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sion, gave an address on "Highway Improvement in Maryland."

On the final day of the convention, the following papers were presented: "Economy and Efficiency in State and Local Governments," by P. H. Drewry, chairman of the legislative committee on efficiency and economy; "Toll Roads in Virginia," by C. L. Scott, jr., highway engineer, Fayette County, W. Va.; "The Automobile and Highway Improvement," Maurice G. Long, attorney, Norfolk, and "Traffic Regulations," A. G. Batchelder, executive chairman, American Automobile Association.

Engineers' Club of Dayton.

The new home of the Engineers' Club of Dayton, the magnificent new building donated by Col. Edward A. Dleds and Charles F. Kettering, was dedicated with appropriate exercises on February 2. Features of the dedication were a reception to ladies in the afternoon, and a banquet in the evening, followed by the dedicatory exercises. The object of the building is "to cement friendship, to educate the youth, to foster all types of engineering work in Dayton and to hold ever aloft our devotion to the truth."

Illinois Firemen's Association.

Among the questions most discussed at the convention of the Illinois Firemen's Association, held at the Masonic Temple, Joliet, Ill., January 8 and 9, was that of pensions. This was discussed by William Lister, city attorney of Evanston; William R. McCabe, state representative, and John Dooley of Chicago.

President Sorgenfrei reviewed the growth of the association during the past year and pointed out that it had gained 80 departments since he took office as president three years ago. The firemen honored the memory of the seventeen comrades who died in service in 1917.

Frank Nelson, Granite City, gave an address on "Fire Hazards in a Manufacturing City." State Fire Marshal John G. Harber spoke on "Fire Prevention and Better Protection." E. W. Weidler took up the subject of "Fire Loss; Its Cause and Remedy." Fire department preparedness was urged in a paper by A. W. Thode, Galena, read by Dennis Ryan. An extended discussion followed Mr. Thode's paper and delegate after delegate took the floor asking that the association send an appeal to the heads of villages to prepare for fire by supplying their firemen with adequate apparatus. A delegate from Dallas appealed to the association to send experienced firemen to that city to lecture to residents so that proper fire equipment be supplied.

Oklahoma Society of Engineers.

A number of legislative matters were taken up at the last annual meeting of the Oklahoma Society of Engineers. A committee was appointed to present to the next legislature a revised highway law, emphasizing efficiency in the building of permanent highways. The society also passed a resolution favoring further extension of good roads and urging further federal aid. The society elected the following officers: President, M. L. Cunningham, state engineer; Secretary-treasurer, H. V. Hinckley, Oklahoma City, Okla.

Carolina Association of Highway Engineers.

The Carolina Association of Highway Engineers was recently organized by the highway engineers of North and South Carolina. The following offices of the society have been elected: R. T. Brown, president, Columbia, S. C.; W. M. Peyton, vice-president, Rutherfordton, N. C.; N. C. Hughes, vice-president, Gaffney, S. C.; N. S. Mullican, county highway engineer, Davidson county, secretary, Lexington, N. C.; and A. F. Brown, treasurer, Owensboro, N. C.

The first regular meeting of the association is to be held in Chapel Hill, N. C., on February 20.

PERSONALS

(*Continued from page* 102.)

commissioner of streets and public improvements, H. H. Crampton.

The following are new mayors:

Willimantic, Conn.—Charles Gates.
Rockville, Conn.—John P. Cameron.
Venice, Cal.—Edward S. Hill.
Greensburg, Ind.—Dr. Cassius C. McCoy.
Taunton, Mass.—William Flood.
Brockton, Mass.—William L. Gleason.
Cambridge, Mass. — Edward W. Quinn.
Marlboro, Mass.—Charles F. McCarthy.
Salem, Mass.—Dennis J. Sullivan.
Chicopee, Mass.—Daniel J. Coakley.
Leominster, Mass.—Henry F. Sawtelle.
Nashua, N. H.—James B. Crowley.
Rochester, N. H.—James B. Young.
Gardiner, Me.—Dr. Charles J. Bragdon.
Boston, Mass—Andrew J. Peters.
Newport, R. I.—Clark Burdick.
Meriden, Conn.—Henry T. King.
Harrisburg, Pa.—Samuel L. Keister.